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PROPERTY OF
L. F. BLANKENSHIP
3924 MEADE ST.
DENVER, COLORADO

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The PHOTOFACT Servicer

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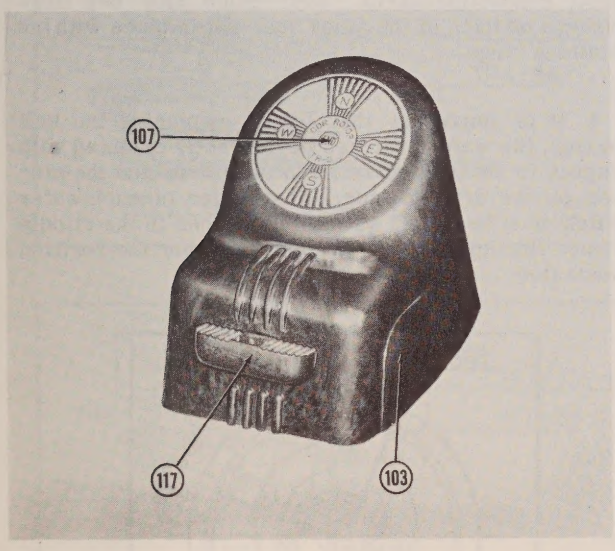
NEW PARTICIPANTS

We are pleased to announce the following new participants:

Pyramid Electric Company and Sangamo Electric Company capacitor replacements will be listed in PHOTOFACT Folders starting with Set No. 267.

The following information on CDR Rotator Model TR-2 is brought to you through the courtesy of The Radiart Corporation, Cleveland, Ohio.



SERVICING THE TRB CONTROL BOX

GENERAL

If the Rotor fails to operate first check to see that the connections have not become broken or loose, if the connections are all in order proceed with normal troubleshooting.

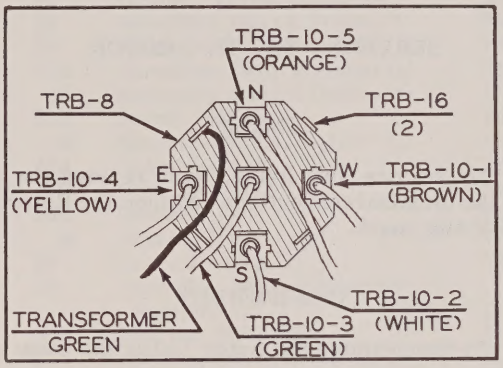
Replacement parts should be ordered through your local distributor. When ordering parts for the control box, give the identifying information stamped on the metal base plate of the control box and the part number.

REMOVING CABINET

To service the internal parts of the control box first remove the control knob. Next remove the station dial from the cabinet by lifting with the fingers, or by gently prying upward with the back edge of an ordinary table knife inserted under the edge of the dial.

It is now necessary to remove the dial from the pilot light assembly. To do this, grasp the two black springs on the side of the dial and gently pull them apart. Then remove the four rubber feet and the cabinet can be removed from the base plate.

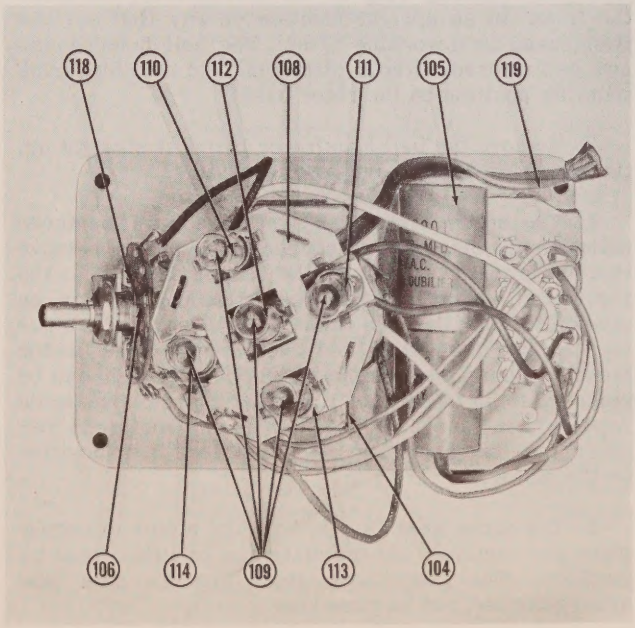
If the sockets are removed from the common plate for repair they should be replaced in the same position.

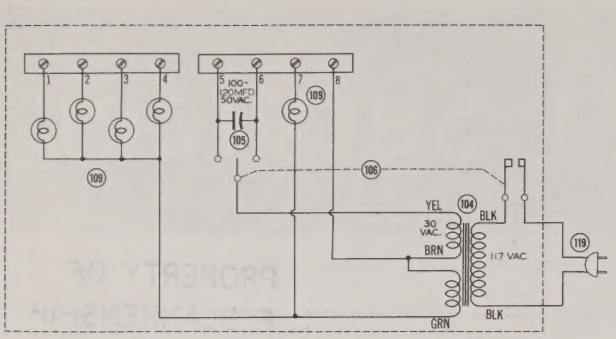


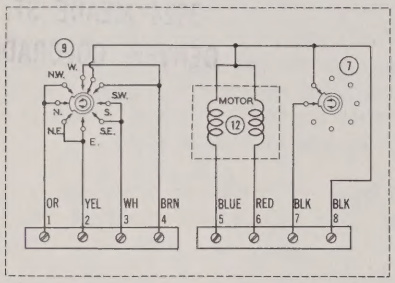
REPLACING INDICATING LIGHTS

To replace the indicating lights it is only necessary to remove the dial from the control cabinet by gently prying it from its position. Then remove the socket from the pilot light assembly.

Use a standard radio type No. 47 dial lamp.







SERVICING THE TR-2 ROTOR

GENERAL

To service the Rotor, first remove the cable from the terminal connections and then the Rotor from its mounting mast.

DISASSEMBLY

To disassemble the Rotor follow the steps given below:

1. The lower mast support casting is removed by removing the four hex head screws at the bottom of the Rotor.

2. To remove the upper mast support or bell housing remove the four round head screws which hold the rotor base to the bell housing with a retaining ring. Hold the retaining ring to the bell housing and place the Rotor in an upright position on any flat surface being used as a working area. The bell housing can now be removed without distrubing the retaining ring from its position on the rotor base.

3. Remove the bell housing by lifting it straight up, the mechanical parts are now accessible.

4. The entire electrical system can be removed without unsoldering any connections. First remove the two screws that hold the terminal strip to the rotor base. Shift the terminal strip until it can be slipped through the hole in the rotor base. By removing the two nuts that hold the motor to the motor mounting plate the complete electrical circuit can be removed from the Rotor. If the wafer switch has to be repaired, it can be removed from the motor by removing the two retaining rings that lock it in position on the motor.

5. The three screws that hold the motor mounting plate are removed and the plate can be lifted from its position. The gears and their spacers are now accessible and can be removed.

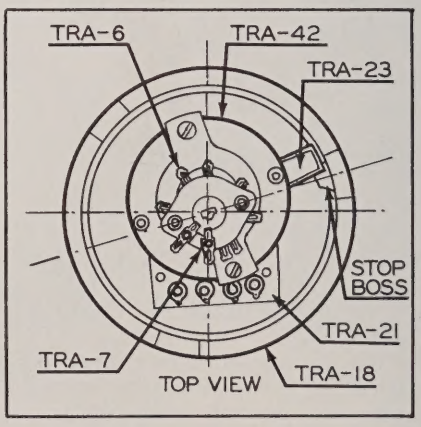
TO ASSEMBLY THE ROTOR

1. Replace the gears and their spacers. Then place the motor mounting plate in its position and replace the three screws.

2. Place the rotor base so that the terminal connecting strip hole at the bottom of the base is toward the repairman. The motor is then placed so that the elongated mounting hole of the motor is over the mounting plate stud that is to the left side of the repairman. The red lead wire on the motor will be to the left and the blue lead wire to the right of the repairman. Now adjust the motor pinion gear with the gear train. Move the motor back and forth along the elongated hole at the same time turn the gear train with the other hand until the best position of the motor is obtained. In the proper position the gears will run quietly without binding, then tighten the motor with the two nuts.

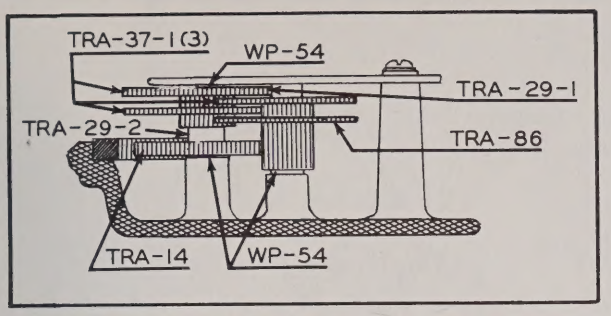
3. To assemble the wafer switch first place a fibre washer on each of the two mounting studs. Then place the lower wafer switch with the side that has the five lugs toward the terminal connecting strip with the dull surface of the switch facing down. Now place the two spacers on the studs and place the upper wafer switch in position with the two lugs pointing toward the terminal connecting strip. Next place the two fibre washers on each of the studs and lock in place with the retaining rings.

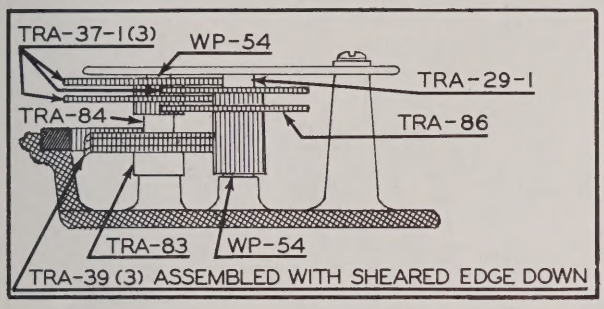
4. It is important that before replacing the bell housing, the wafer switches be correctly oriented with respect to the end-of-rotation stop arm and the stop boss on the driving gear. The center of each wafer switch must be turned so that the notches in the middle of each line up and are turned to assume the position illustrated.

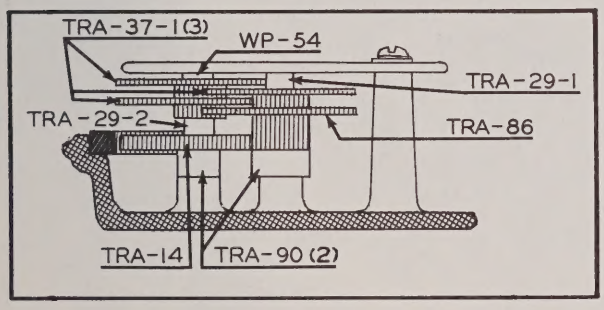


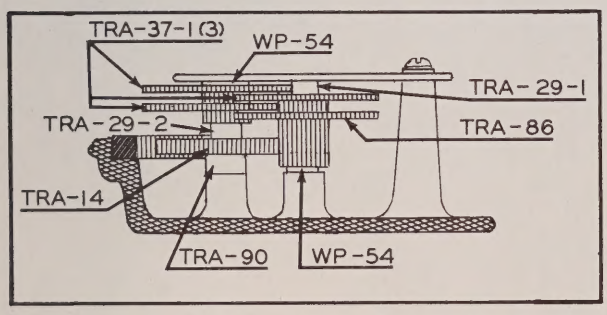
5. When replacing the upper bell housing care must be taken to insure that the pin which protrudes from the inside of the bell housing is guided into the hole of the wafer switches. The pin has two flattened sides which match the two flat sides in the wafer switches.

6. After the bell housing is placed on the rotor base shift it carefully until the slots fit into the lugs of the driving gear. Replace the four round head screws of the housing retainer ring which holds the bell housing to the Rotor base and replace the lower mast support.







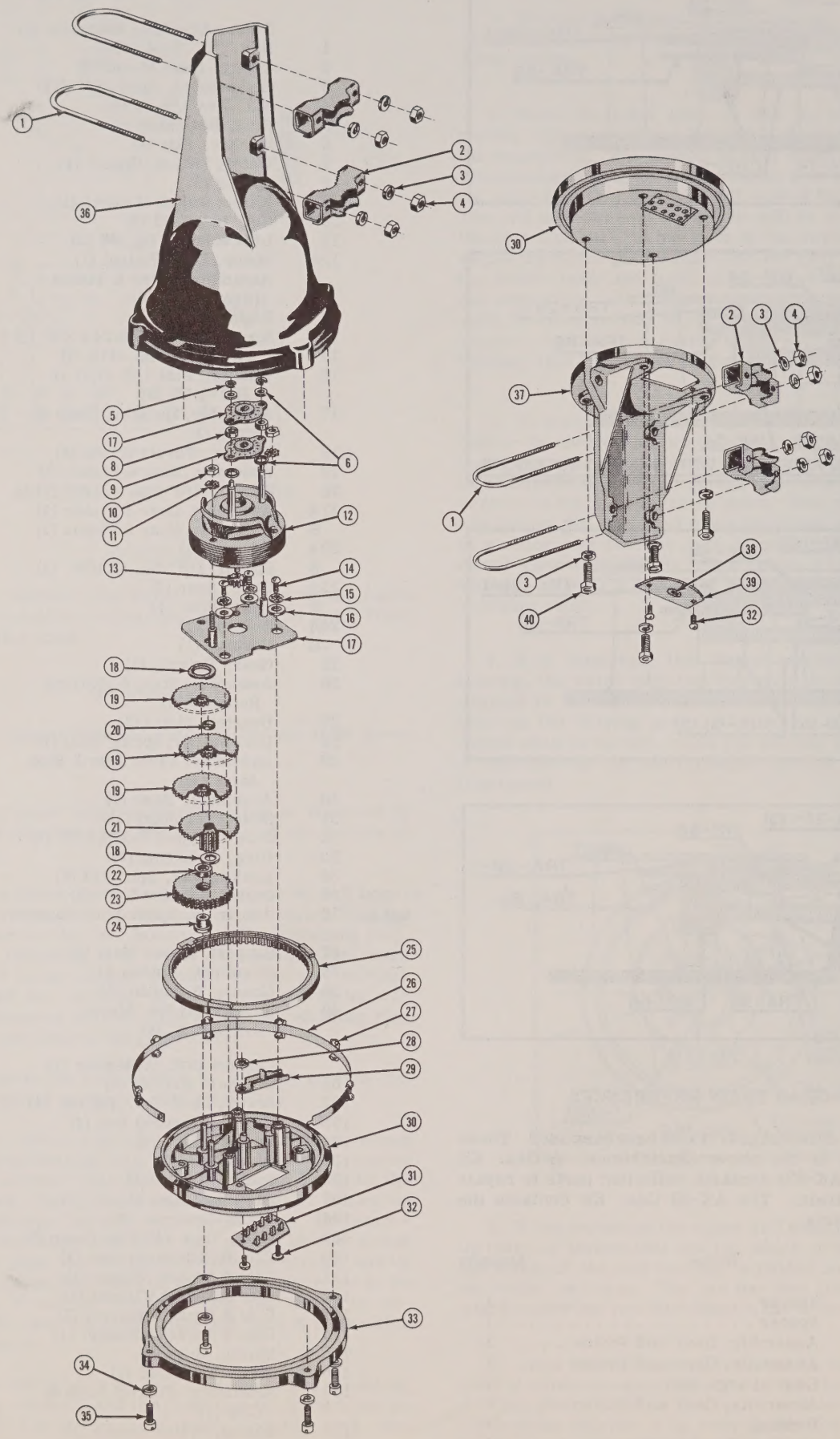


GEAR TRAIN REFERENCES

Four different gear trains have been used. These are shown in the above illustrations. A Gear Kit (Part No. AK-83) contains sufficient parts to repair any gear train. The AK-83 Gear Kit contains the following parts:

Part No.	Name	Quanity
TRA-29-1	Spacer	1
TRA-29-2	Spacer	1
TRA-37-1	Assembly, Gear and Pinion	3
TRA-37-2	Assembly, Gear and Pinion	1
TRA-14	Gear, Large Spur	1
TRA-86	Assembly, Gear and Pinion	1
TRA-90	Bushing	1
WP-54	Washer, Thurst Brass	4

ITEM NO.	DESCRIPTION (No. in ( ) is Quantity Used)	PART NO.
	Rotor, Assembly Complete (1)	TRA
1	Bolt, "U" Type (4)	TRA-64
2	Clamp, Most Mount (4)	TRA-59
3	Lockwasher, Split 1/4" (12)	WK-11-2
4	Nut, Hex 1/4-20 (8)	NM-50-2
5	Ring, Retaining (2)	RCP-29-4
6	Washer, Flat (4)	MX-47
7	Wafer, Switch (Upper) (1)	TRA-7
8	Spacer (2)	AMX-191
9	Wafer, Switch (Lower) (1)	TRA-6
10	Nut, Hex 8-32 (2)	NM-43-2
11	Lockwasher, Int. #8 (2)	WL-45-2
12A	Motor (Less Pinion) (1)	TRA-10-4
B	Assembly, Motor & Pinion (Item 13) (1)	TRA-42
13	Pinion (1)	TRA-12
14	Screw, Type F 10-24 x 3/8" (3)	SS-61-2
15	Lockwasher, Int. #10 (3)	WL-6-2
16	Washer, Flat 1/2" O.D. x .203" I.D. (3)	WP-14-2
17	Assembly, Mounting Plate & Studs (1)	TRA-32
18	Washer, Thrust Brass (4)	WP-54
19	Assembly, Gear & Pinion (3)	TRA-37-1
20	Spacer, 3/8" dia. x .125" (1)	TRA-29-1
21A	Assembly, Gear & Pinion (1)	TRA-86
B	Assembly, Gear & Pinion (1)	TRA-37-2
22A	Spacer, (1)	TRA-84
B	Spacer, 3/8" dia. x .188" (1)	TRA-29-2
23A	Gear, Spur (3)	TRA-39
B	Gear, Spur (1)	TRA-14
24A	Bushing (1)	TRA-83
B	Bushing (1)	TRA-90
25	Gear, Driving (1)	TRA-18
26	Assembly, Strap & Bearing Retainer (1)	TRA-36
27	Bearing, Ball (12)	TRA-20-1
28	Lockwasher, Spring Grip (1)	WL-28-7
29	Assembly, Pivot Arm & Stop Angle (1)	TRA-23
30	Assembly, Base (1)	TRA-87
31	Strip, Terminal (1)	TRA-21
32	Screw, Type I 6-32 x 3/8" (2)	SS-65-2
33	Ring, Retaining (1)	TRA-4
34	Lockwasher, Split #12 (4)	WC-45-2
35	Screw, 12-28 x 5/8" (4)	SL-5-2
36	Assembly, Upper Mast Support (1)	TRA-1-2
37	Support, Lower Mast (1)	TRA-2
38	Grommet, Rubber (1)	IG-5
39	Cover, Terminal (1)	TRA-24
40	Screw, Hex Hd. Mach. 1/4-20 x 1" (4)	SM-120-2
	Control Box, Assembly (1)	TRB
101	Bumper, Recess (4)	RP-35
102	Screw, Thrd. Cut., Rd. Hd. (4)	SS-71-2
103	Cabinet, Control Box (1)	TRB-1
104	Transformer (1)	TRB-3
105	Capacitor (1)	TRB-4-2
106	Switch, Wafer (1)	TRB-5-4
107	Dial, Indicator (1)	TRB-7
108	Plate, Common (1)	TRB-8
109	Bulb, Type #47 Dial Lamp (5)	TRB-9
110	Clip & Socket (Brown) (1)	TRB-10-1
111	Clip & Socket (White) (1)	TRB-10-2
112	Clip & Socket (Green) (1)	TRB-10-3
113	Clip & Socket (Yellow) (1)	TRB-10-4
114	Clip & Socket (Orange) (1)	TRB-10-5
115	Spring, Snap (2)	TRB-16
116	Strip, Terminal (1)	TRA-21
117	Assembly, Control Knob & Clip (1)	TRB-33
118	Spring, Wafer Switch (1)	TRB-34
119	Cord & Plug AC (1)	WM-12-1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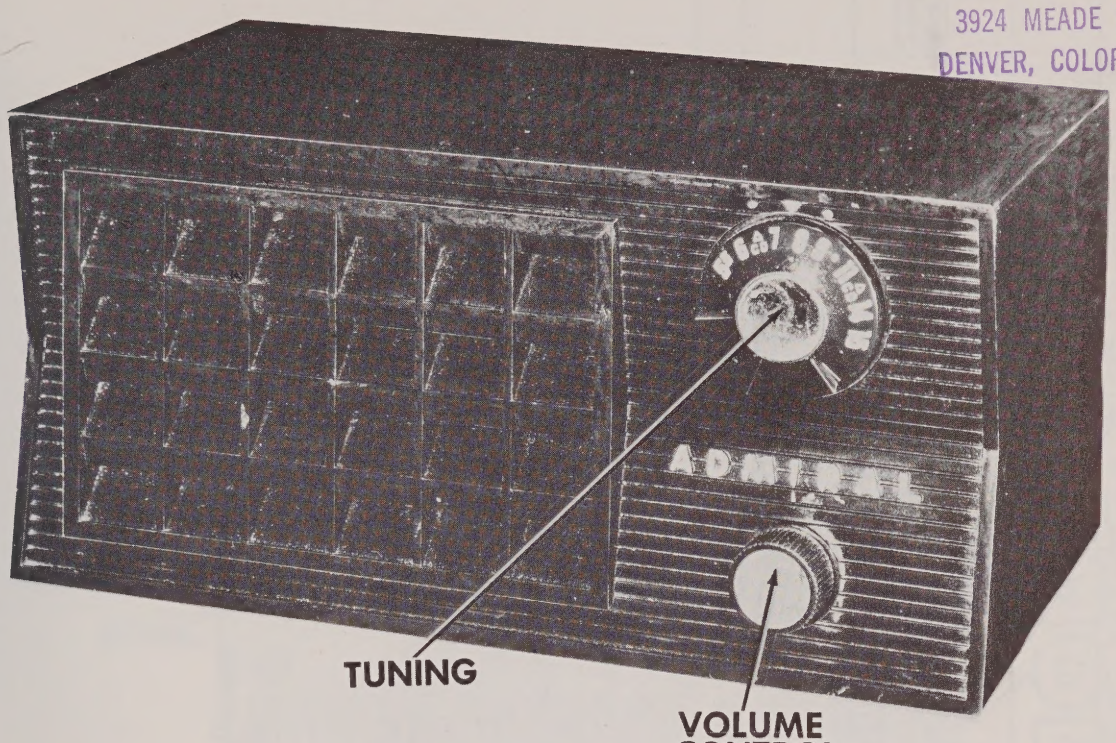
PROPERTY OF
L. F. BLANKENSHIP
3924 MEADE ST.
DENVER, COLORADO

ADMIRAL
CHASSIS 5R3, 5S3



ADMIRAL
CHASSIS 5R3, 5S3

TRADE NAME	Admiral Models 5R32, 5R33, 5R35, 5R36, 5R37, 5R38 (Ch. 5R3), 5S32, 5S33, 5S34, 5S35, 5S38 (Ch. 5S3)
MANUFACTURER	Admiral Corp., 3800 W. Cortland St., Chicago 47, Ill.
TYPE SET	AC-DC Operated AM Superheterodyne Receiver (Ch. 5S3 AC Only With Electric Clock)
TUBES (Five)	Types 12BE6 Conv., 12BA6 IF Amp., 12AV6 Det-AVC-AF Amp., 50C5 Output, 35W4 Rectifier
POWER SUPPLY	110-120 Volts AC-DC (Ch. 5S3 AC Only) RATING .22 Amp. @ 117 Volts AC
TUNING RANGE—BROADCAST	535KC - 1620KC

ALIGNMENT INSTRUCTIONS—READ CAREFULLY BEFORE ATTEMPTING ALIGNMENT

Volume control should be at maximum position. Output of signal generator should be no higher than necessary to obtain an output reading. Use an insulated alignment screwdriver for adjusting.
Loop should be maintained in same relative position to chassis as when receiver is in cabinet.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	RADIO DIAL SETTING	OUTPUT METER	ADJUST	REMARKS
1	.1MFD	High side to pin 7 (grid) of 12BE6 (V1). Low side to B-.	455KC (400~ Mod)	Tuning gang fully open.	Across voice coil.	A1, A2, A3, A4	Adjust for maximum output. If isolation transformer is not used, reduce dummy antenna to .001MFD to reduce hum modulation.
2	"	"	1620KC	"	"	A5	"
3	Direct	Loop	1400KC	Tune to 1400KC signal.	"	A6	Fashion loop of several turns of wire and radiate signal into loop of receiver. Adjust for maximum output.

HOWARD W. SAMS & CO., INC. • Indianapolis 5, Indiana

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PARTS LIST AND DESCRIPTIONS

ADMIRAL MODEL 5R32 (Ch. 5R3)

TUBES (SYLVANIA, GENERAL ELECTRIC, WESTINGHOUSE)

ITEM No.	USE	REPLACEMENT DATA: ADMIRAL PART No.	REPLACEMENT DATA: STANDARD REPLACEMENT	RETMA BASE TYPE	NOTES
V1	Converter	12BE6	12BE6	7CH	
V2	IF Amp.	12BA6	12BA6	7BK	
V3	Det-AVC-AF Amp.	12AV6	12AV6	7BT	
V4	Audio Output	50C5	50C5	7CV	
V5	Rectifier	35W4	35W4	5BQ	

CAPACITORS

Capacity values given in the rating column are in mfd. for Electrolytic and Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING: CAP.	RATING: VOLT	REPLACEMENT DATA: ADMIRAL PART No.	CENTRALAB PART No.	ERIE PART No.	MALLORY PART No.	PYRAMID PART No.	SANGAMO PART No.	
C1A	■50	150	67C30-1			FP213	TM-5030-150	D065	Note 1
B	▲30	150							
C2	10000		65C10-3	DD-103	811-01	DC-511			
C3	10000		65C10-3	DD-103	811-01	DC-511			
C4	47		65C6-79	D6-470	GP1K-470	UC-5447		K-1447	
C5	.05	200	64A12-1						
C6	10000		65C10-3	DD-103	811-01	DC-511			
C7A	220		♦63B6-14						
B	5000								
C	5000								
D	250								
E									
C8	10000		65C10-3	DD-103	811-01	DC-511			
C9	.047	400	65A13-5	DF-503		PT4147	IMP4-S47	3304147	

Note 1. Chassis 5S3 use 70MFD for C1A. (C1 part #67C30-2).
♦ Items C7A, C7B, C7C, C7D, C7E, R5A, R5B, R5C are combined in one unit.
When replacing items separately, C7D and C7E should total 250MMF.

CONTROLS

ITEM No.	RATING: RESISTANCE	RATING: WATTS	REPLACEMENT DATA: ADMIRAL PART No.	IRC PART No.	CLAROSTAT PART No.	CENTRALAB PART No.	MALLORY PART No.	INSTALLATION NOTES
R1	1Meg	½	75C25-1					Volume & Switch - Note

Note. Chassis 5S3 uses control part no. 75C25-2.

RESISTORS

ITEM No.	RATING: OHMS	RATING: WATT	REPLACEMENT DATA: ADMIRAL PART No.	REPLACEMENT DATA: IRC PART No.	NOTES
R2	22KΩ	½	60B8-223	BTS-22K	
R3	100Ω	½	60B8-101	BTS-100	
R4	2.2Meg	½	60B8-225	BTS-2.2Meg	
R5A	6.8Meg	½	♦63B6-14	BTS-6.8Meg	
B	470KΩ	½		BTS-470K	
C	470KΩ	½		BTS-470K	

ITEM No.	RATING: OHMS	RATING: WATT	REPLACEMENT DATA: ADMIRAL PART No.	REPLACEMENT DATA: IRC PART No.	NOTES
R6	150Ω	½	60B8-151	BTS-150	
R7	1200Ω	2	60B14-122	BTB-1200	

♦ Items R5A, R5B, R5C, C7A, C7B, C7C, C7D and C7E are combined in one unit.

TRANSFORMER (AUDIO OUTPUT)

ITEM No.	IMPEDANCE: PRI.	IMPEDANCE: SEC.	REPLACEMENT DATA: ADMIRAL PART No.	Stancor PART No.	Merit PART No.	Triad PART No.	Halldorson PART No.	Thordarson PART No.	NOTES
T1	2.3KΩ	3.3Ω	Part of speaker	A-3332	A-3025	S-12X	Z1101	26S58	

PARTS LIST AND DESCRIPTIONS (Continued)

SPEAKER

ITEM No.	RATINGS: SIZE	RATINGS: FIELD	RATINGS: V. C. IMP.	REPLACEMENT DATA: ADMIRAL PART No.	REPLACEMENT DATA: JENSEN PART No.	REPLACEMENT DATA: QUAM PART No.	NOTES
SP1	4"	PM	3.3Ω	78B94-1	ST-113 Mod. P4-X	4A07	

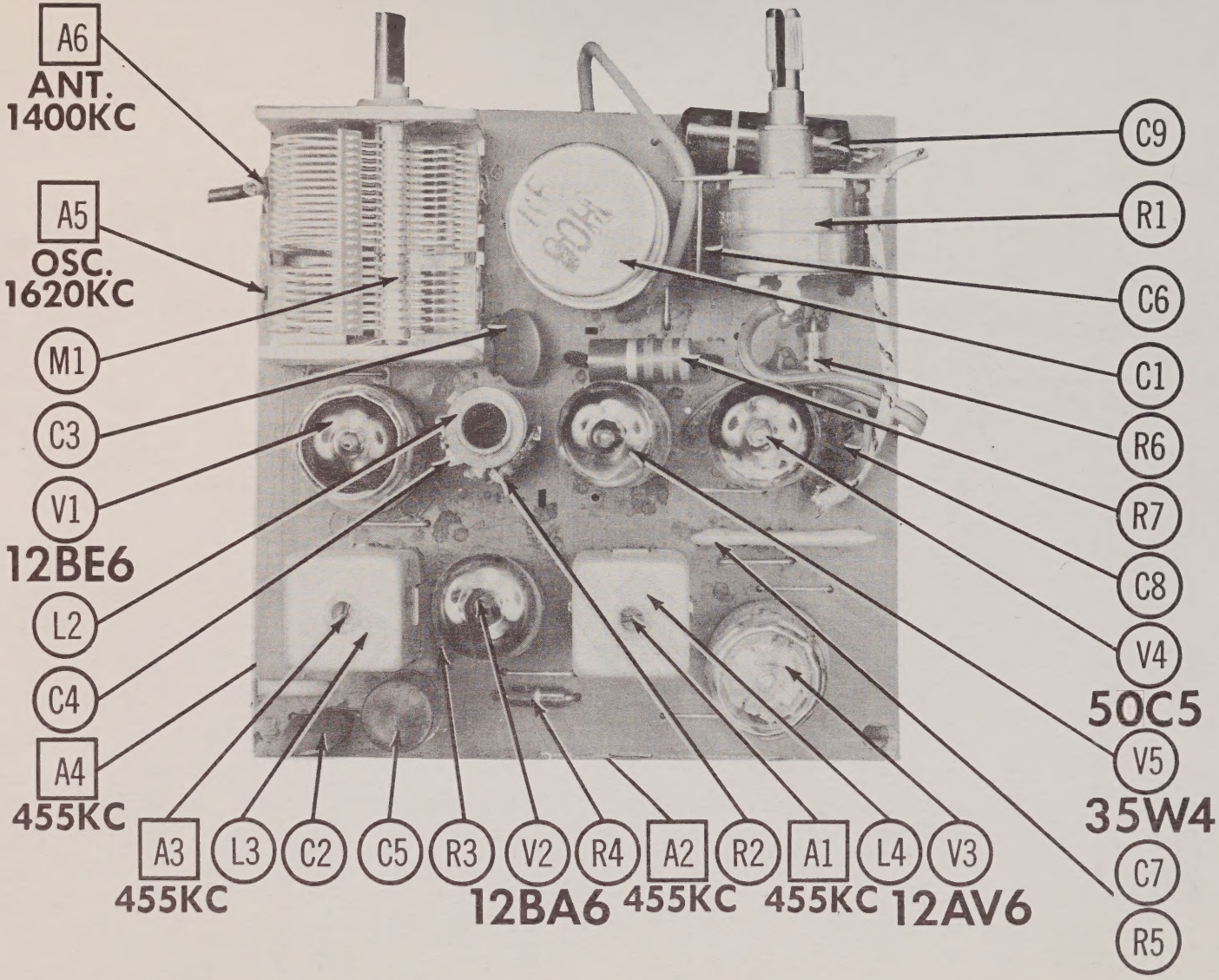
COILS (RF-IF)

ITEM No.	USE	DC RES.: PRI.	DC RES.: SEC.	REPLACEMENT DATA: ADMIRAL PART No.	REPLACEMENT DATA: MEISSNER PART No.	REPLACEMENT DATA: MERIT PART No.	REPLACEMENT DATA: MILLER PART No.	NOTES
L1	Loop Ant.	3.1Ω		69C198-1*				Includes Cabinet back Tapped ⓐ . 8Ω-Includes R2 and C4
L2	Osc. Coil	7Ω		69A190-2				
L3	Input IF	15Ω	15Ω	72C28-65	16-6758	BC-352	13-PC1	
L4	Output IF	15Ω	15Ω	72C28-65	16-6758	BC-353	13-PC2	

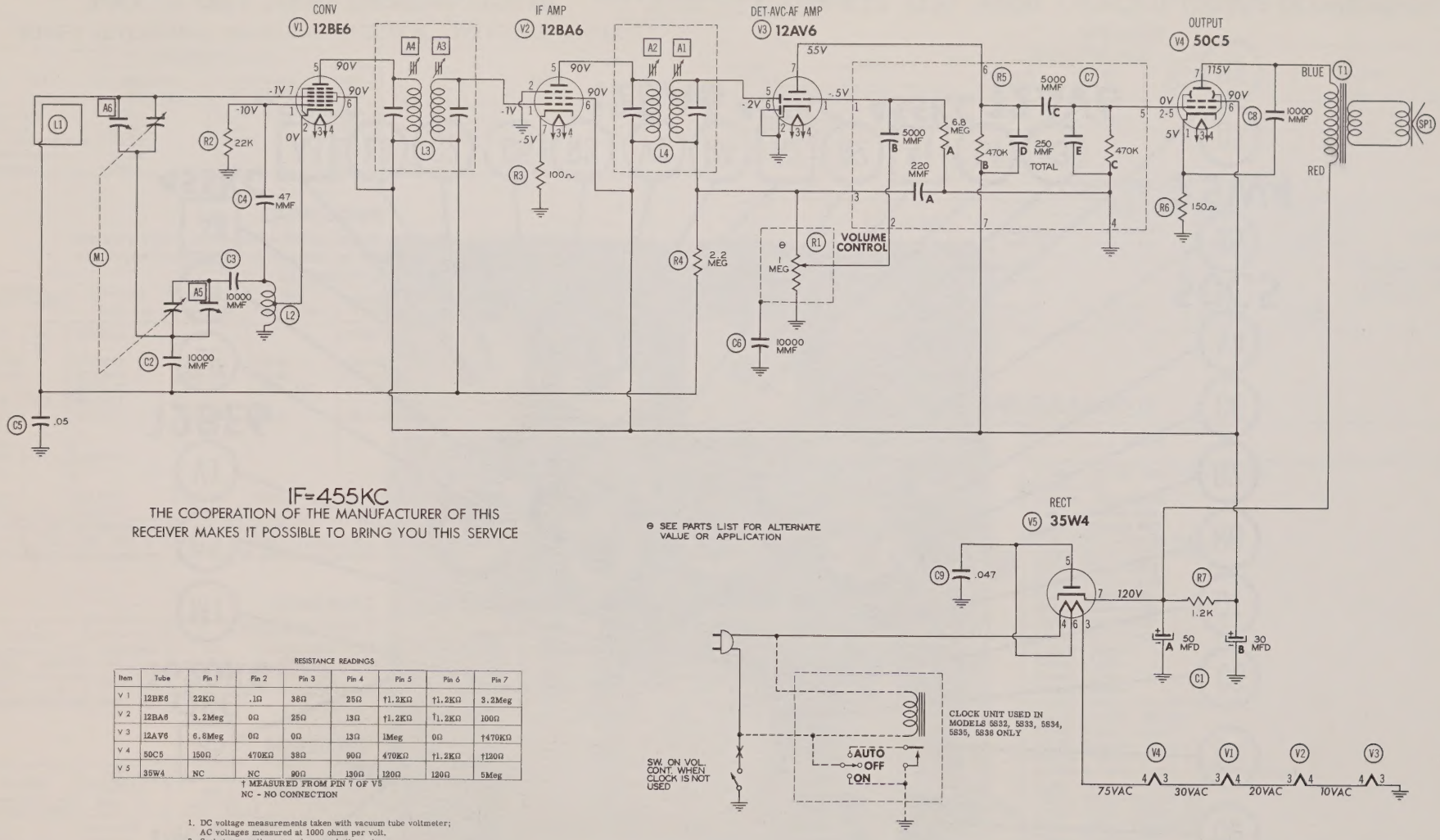
* In chassis 5S3 - part no. 69C199-1 is used.

MISCELLANEOUS

ITEM No.	PART NAME	ADMIRAL PART No.	NOTES
M1	Tuning Cap.	68B64-1	2 Gang - Tuning capacity not available.
M2	Clock	91C14-1	Chassis 5S3
	Cabinet	34D77-2	Maroon - Chassis 5R3
	Cabinet	34D77-6	Ivory - Chassis 5R3
	Cabinet	34D77-7	Green - Chassis 5R3
	Cabinet	34D77-9	Cherry Red - Chassis 5R3
	Cabinet	34D77-10	Sungold Yellow - Chassis 5R3
	Cabinet	34D77-11	Beige - Chassis 5R3
	Cabinet	34D78-2	Maroon - Chassis 5S3
	Cabinet	34D78-6	Ivory - Chassis 5S3
	Cabinet	34D78-7	Green - Chassis 5S3
	Cabinet	34D78-9	White - Chassis 5S3
	Cabinet	34D78-10	Cherry Red - Chassis 5S3
	Knob	33C133-3	Tuning - Maroon
	Knob	33C133-5	Tuning - Ivory
	Knob	33C133-7	Tuning - Green
	Knob	33C133-13	Tuning - White
	Knob	33C133-11	Tuning - Beige - Chassis 5R3 only.
	Knob	33C133-4	On-Off-Volume - Maroon
	Knob	33C133-6	On-Off-Volume - Ivory
	Knob	33C133-8	On-Off-Volume - Green
	Knob	33C133-14	On-Off-Volume - White
	Knob	33C133-12	On-Off-Volume - Beige - Chassis 5R3 only.
	Knob	91C14-11	Clock - Maroon - Chassis 5S3
	Knob	91C14-12	Clock - Ivory - Chassis 5S3
	Knob	91C14-13	Clock - Green - Chassis 5S3
	Knob	91C14-15	Clock - White - Chassis 5S3
	Crystal	24B19	Clock - Chassis 5S3



CHASSIS TOP VIEW



IF=455KC

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θ SEE PARTS LIST FOR ALTERNATE VALUE OR APPLICATION

RESISTANCE READINGS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7
V 1	12BE6	22KΩ	.1Ω	38Ω	25Ω	†1.2KΩ	†1.2KΩ	3.2Meg
V 2	12BA6	3.2Meg	0Ω	25Ω	13Ω	†1.2KΩ	†1.2KΩ	100Ω
V 3	12AV6	6.8Meg	0Ω	0Ω	13Ω	1Meg	0Ω	†470KΩ
V 4	50C5	150Ω	470KΩ	38Ω	90Ω	470KΩ	†1.2KΩ	†120Ω
V 5	35W4	NC	NC	90Ω	130Ω	120Ω	120Ω	5Meg

† MEASURED FROM PIN 7 OF V5
NC - NO CONNECTION

1. DC voltage measurements taken with vacuum tube voltmeter; AC voltages measured at 1000 ohms per volt.
2. Socket connections are shown as bottom views.
3. Measured values are from socket pin to common negative.
4. Line voltage maintained at 117 volts for voltage readings.
5. Nominal tolerance on component values makes possible a variation of ± 15% in voltage and resistance readings.
6. Volume control at maximum, no signal applied for voltage measurements.

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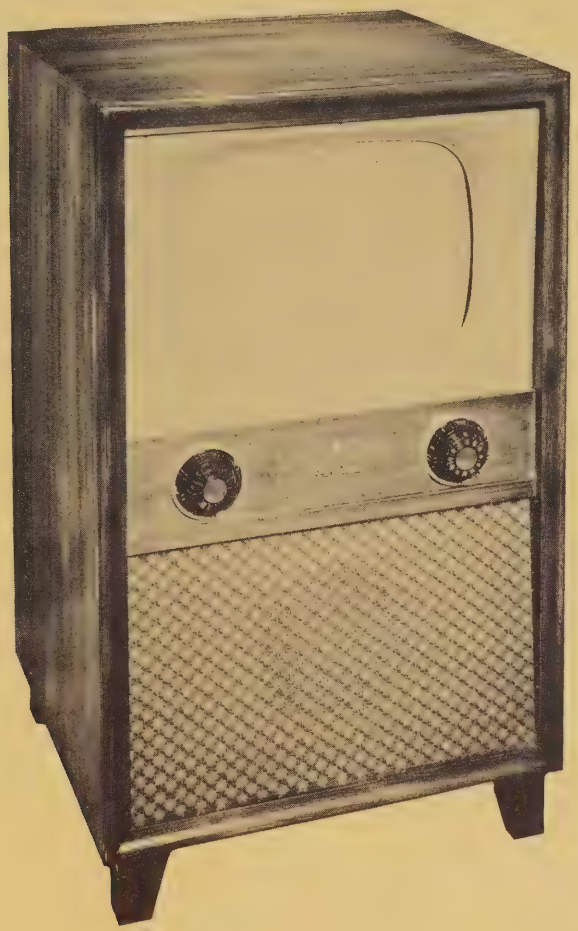

MODEL GSL-3183A

AIRLINE MODELS
GSL-3164A, B, C, GSL-3183A, B, C

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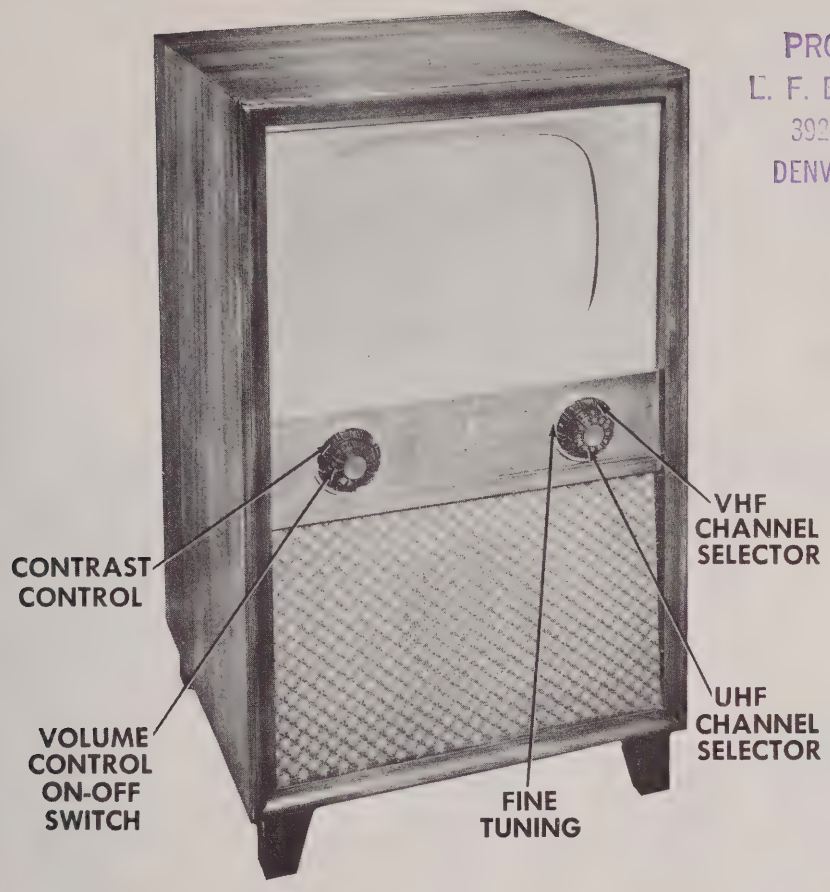

AIRLINE MODELS
GSL-3164A, B, C, GSL-3183A, B, C

AIRLINE MODEL GSL-3183A

TRADE NAME	Airline Models GSL-3164A, GSL-3164B, GSL-3164C, GSL-3183A, GSL-3183B, GSL-3183C
MANUFACTURER	Montgomery Ward & Co., 619 Chicago Ave., Chicago, Illinois
TYPE SET	Television Receiver
TUBES	Twenty

POWER SUPPLY 110-120 Volts AC-60 Cycles RATING 1.46 Amp. @ 117 Volts AC
TUNING RANGE-Channels 2 thru 13 VHF, 14 thru 83 UHF, Video IF 45.75MC, Sound IF 41.25MC (Intercarrier)

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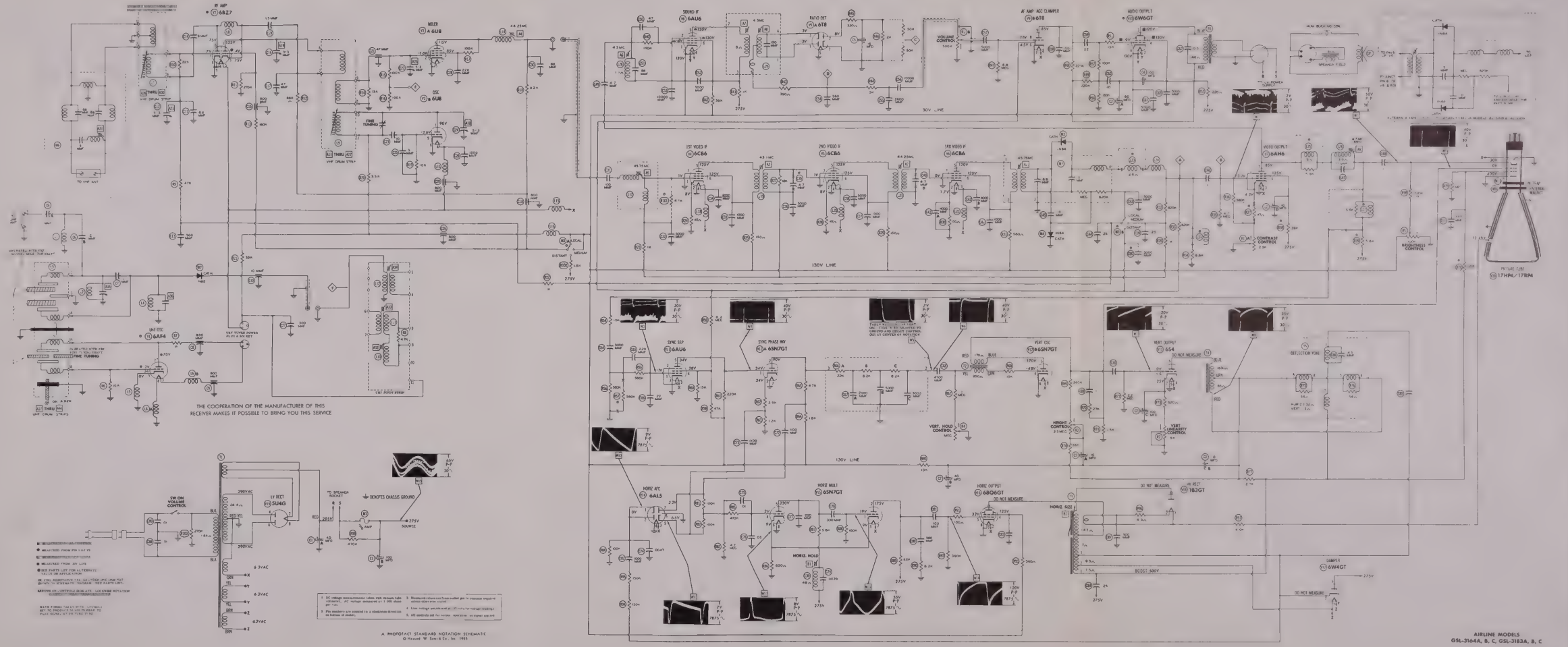
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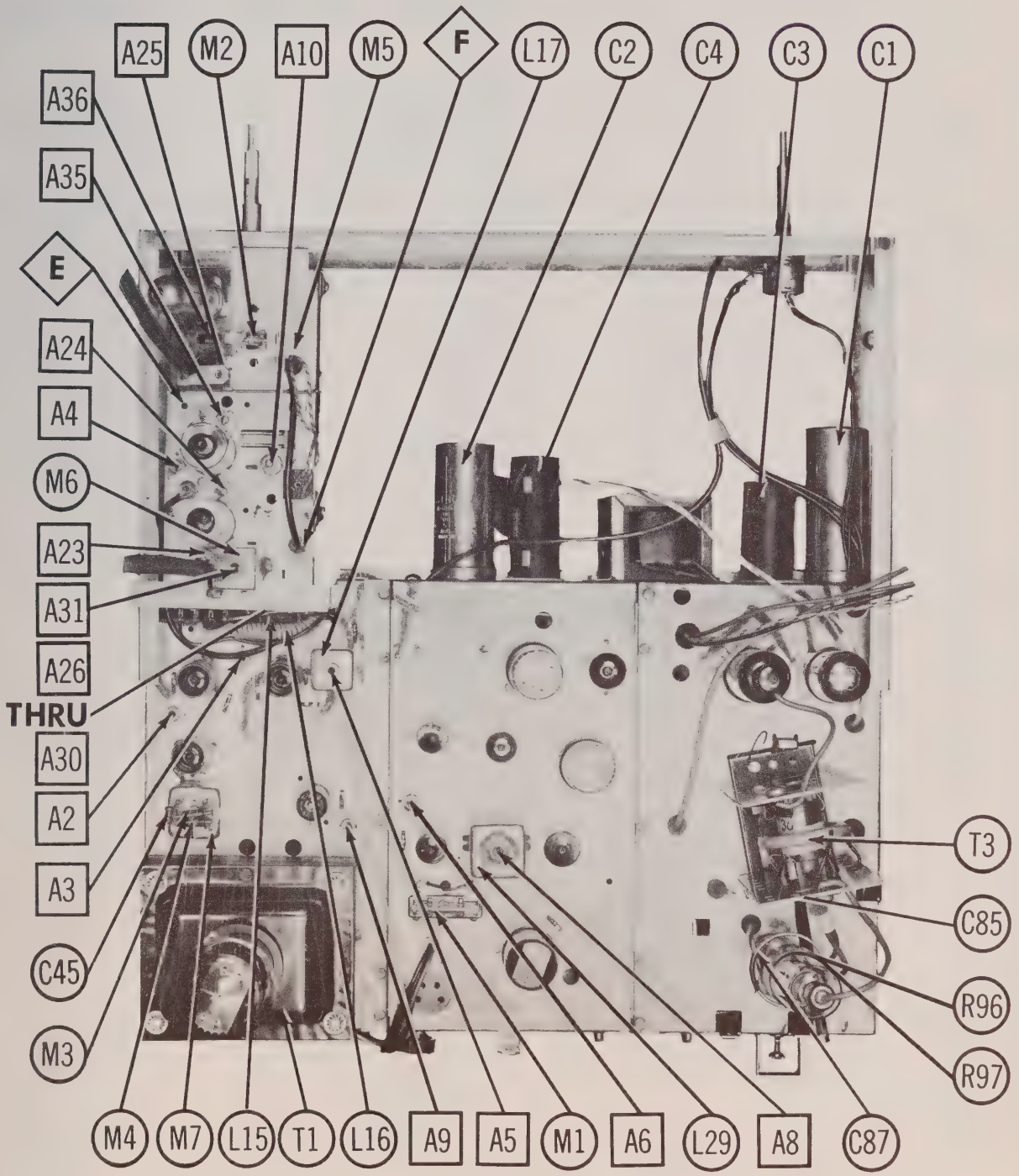

CHASSIS TOP VIEW

SET 272 FOLDER 2

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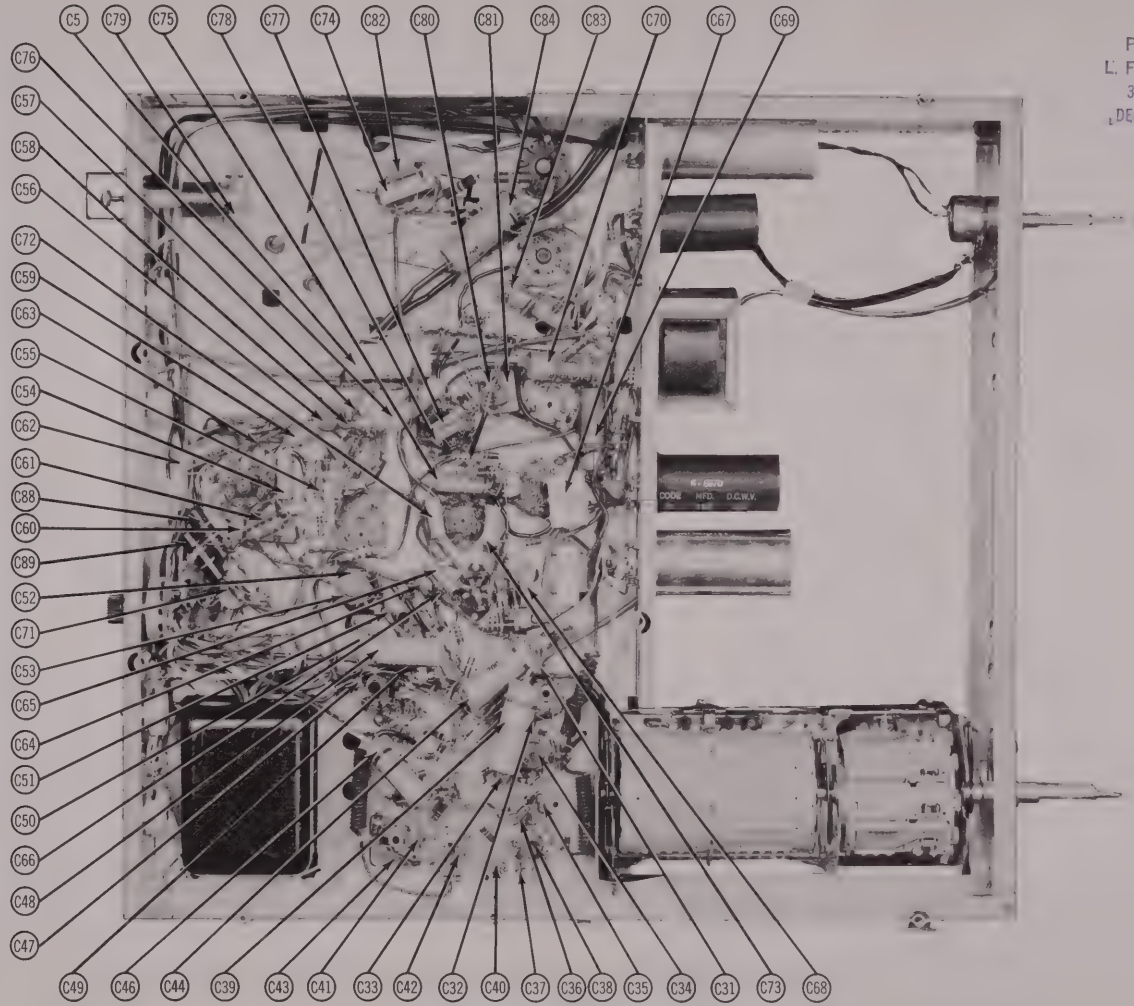

CHASSIS BOTTOM VIEW-CAPACITOR IDENTIFICATION

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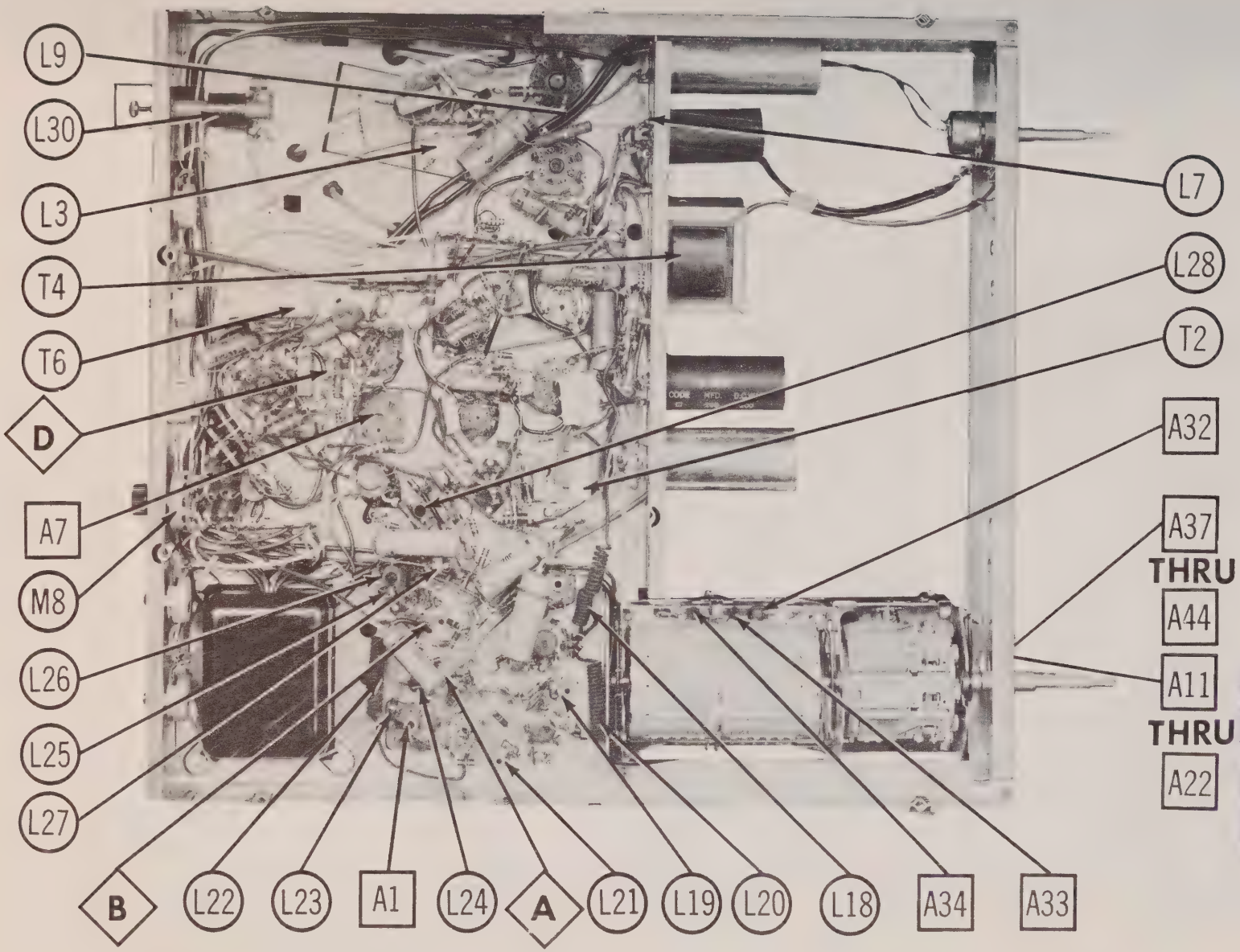
MODELS GSL-3164A, B, C, GSL-3183A, B, C



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CHASSIS BOTTOM VIEW-TRANS., INDUCTOR AND ALIGNMENT IDENTIFICATION

MODELS GSL-3164A, B, C, GSL-3183A, B, C

AIRLINE

ALIGNMENT INSTRUCTIONS

ALIGNMENT INSTRUCTIONS—READ CAREFULLY BEFORE ATTEMPTING ALIGNMENT

The high voltage lead should be securely taped and kept away from the chassis. Do not remove horizontal oscillator tube (V15) to disable the high voltage. Allow warm-up time for receiver and test equipment before starting alignment.

VIDEO IF ALIGNMENT

Remove the converter tube (V2) and replace with one with pin 6 removed. This will disable the local oscillator and reduce the possibility of erroneous indications.
Set AGC switch in "medium" position.
Connect the negative lead of a 3 volt battery to C39. Positive lead to chassis.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	CHANNEL	CONNECT VTVM	ADJUST	REMARKS
1.	Direct	High side to an ungrounded tube shield floating over dummy converter tube. Low side to chassis.	45.75MC (Unmod)	Any	DC probe to point Ⓐ. Common to chassis.	A1	Adjust for maximum deflection. Attenuate signal generator to maintain not more than 2 volts at VTVM.
2.	"	"	44.25MC (Unmod)	"	"	A2	"
3.	"	"	43.1MC (Unmod)	"	"	A3	"
4.	"	"	44.25MC (Unmod)	"	"	A4	Detune A5 by rotating slug out to maximum. Then adjust A4 for maximum deflection.
5.	"	"	45.75MC (Unmod)	"	"	A5	Adjust for maximum deflection on VTVM. Attenuate generator to maintain not more than 2 volts output at VTVM.

OVERALL VIDEO IF RESPONSE CHECK

Connect the synchronized sweep voltage from the sweep generator to the horizontal input of the oscilloscope for horizontal deflection.

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
6.	Direct	High side to an ungrounded tube shield floating over dummy converter tube. Low side to chassis.	44MC (10MC Swp)	45.75MC 42.50MC	Any	Vert. Amp. thru 47KΩ to point Ⓐ. Low side to chassis.		Adjust for response curve similar to Fig. 1. Retouch A1 thru A5 for desired response. A1 and A4 controls 45.75MC marker, A5 controls 42.50MC marker.

SOUND IF ALIGNMENT USING AM SIGNAL GENERATOR AND VTVM

Remove V6 from its socket. Set contrast control to maximum contrast position. Connect two 50KΩ resistors across C5. for alignment point Ⓒ.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	CHANNEL	CONNECT VTVM	ADJUST	REMARKS
7.	.001MFD	High side to point Ⓑ. Low side to chassis.	4.5MC (Unmod)	Any	DC probe thru 47KΩ to point Ⓒ. Common to chassis.	A6, A7	Adjust for maximum deflection. Bottom of chassis for A7 location.
8.	"	"	"	"	DC probe thru 47KΩ to point Ⓓ. Common to chassis.	A8	Adjust for zero reading on VTVM. A positive and negative reading will be obtained on either side of the correct setting. Replace V6 in its socket. Disconnect generator and VTVM. Tune in a clear TV station. Note if sound buzz is audible. If present, SLIGHTLY retouch A8 for clearest sound and MINIMUM buzz.

SOUND IF ALIGNMENT USING FM SIGNAL GENERATOR AND OSCILLOSCOPE

Remove V6 from its socket. Set contrast control to maximum contrast position.
Use frequency modulated signal with 60% modulation and 450KC sweep. Use 120% sawtooth voltage in scope for horizontal deflection.

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
7.	.001MFD	High side to point Ⓐ. Low side to chassis.	4.5MC (450KC Swp)	4.5MC	Any	Vert. Amp. thru 47KΩ to point Ⓒ. Low side to chassis.	A6, A7	Disconnect stabilizing capacitor C7. Adjust for curve of maximum amplitude and symmetry similar to Fig. 2.
8.	"		"	"	"	Vert. Amp. thru 47KΩ to point Ⓓ. Low side to chassis.	A8	Reconnect stabilizing capacitor C7. Adjust so that 4.5MC occurs at center of crossover lines as in Fig. 3. SLIGHTLY retouch A7 for maximum amplitude and straightness of crossover lines. Replace V6 in socket. Disconnect generator and scope from set. Tune in a TV station. Check sound for buzz. If buzz is noted, retouch A8 for clearest sound and MINIMUM buzz.

4.5MC TRAP ALIGNMENT

Remove V6 from its socket.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	CHANNEL	CONNECT VTVM	ADJUST	REMARKS
9.	.001MFD	High side to pin 11 (cathode) of picture tube. Low side to chassis.	4.5MC (Unmod)	Any	DC probe to point Ⓒ. Low side to chassis.	A9	Adjust for MINIMUM deflection. Replace V6 in its socket.

ALTERNATE 4.5MC TRAP ALIGNMENT

Tune in the strongest TV station available and adjust A8 for minimum 4.5MC beat in picture.

ALIGNMENT INSTRUCTIONS (cont)

OSCILLATOR ALIGNMENT (VHF TUNERS)

Remove the dummy converter tube and replace the original 6U8 in its socket.
The VHF channel adjustment screws are reached thru a hole just to the top of the channel switch shaft. The correct adjustment screw is accessible thru this hole on the channel switch is turned to each VHF channel.
Connect the synchronized sweep voltage from the sweep generator to the horizontal input of the oscilloscope for horizontal deflection.
The sweep generator output lead should be terminated with its characteristic impedance, usually 50 ohms.
Set the fine tuning control to the mid-position of its range.
Connect the positive lead of a 3 volt battery to ungrounded side of C34. Positive lead to ground. AGC switch in "medium" position.

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
10.	Two 120Ω Carbon Resistors	Across VHF antenna terminals with 120Ω in each lead.	213MC (10MC Swp)	211.25MC 215.75MC	13	Vert. Amp. thru 47KΩ to point (A). Low side to chassis.	A11	Adjust to place sound marker in trap notch as in Fig. 4. Video marker should be at 50% on response curve. If channels are off in same direction. Adjust A10 for proper response.
			207MC (10MC Swp)	205.25MC 209.75MC	12		A12	
			201MC (10MC Swp)	199.25MC 203.75MC	11		A13	
			195MC (10MC Swp)	193.25MC 197.75MC	10		A14	
			189MC (10MC Swp)	187.25MC 191.75MC	9		A15	
			183MC (10MC Swp)	181.25MC 185.75MC	8		A16	
			177MC (10MC Swp)	175.25MC 179.75MC	7		A17	
			85MC (10MC Swp)	83.25MC 87.75MC	6		A18	
			79MC (10MC Swp)	77.25 MC 81.75MC	5		A19	
			69MC (10MC Swp)	67.25MC 71.75MC	4		A20	
			63MC (10MC Swp)	61.25MC 65.75MC	3		A21	
			57MC (10MC Swp)	55.25MC 59.75MC	2		A22	

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RF AND MIXER ALIGNMENT (VHF TUNER)

Ground AGC line at terminal (D) on back of tuner.
Connect the synchronized sweep voltage from the sweep generator to the horizontal input of the oscilloscope for horizontal deflection.
The sweep generator output lead should be terminated with its characteristic impedance, usually 50 ohms.

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
11.	Two 120Ω Carbon Resistors	Across VHF antenna terminals with 120Ω in each lead.	207MC (20MC Swp)	205.25MC 209.75MC	12	Vert. Amp. thru 47KΩ to point (E). Low side to chassis.	A23, A24, A25	Adjust for response similar to Fig. 5.
12.	"	"	213MC (20MC Swp)	211.25MC 215.75MC	13	"		Check for response similar to Fig. 5. If markers fall below 70% on any channel make compromise adjustment of A23, A24, and A25 with channel switch set to that channel and recheck all channels to see that they have not been seriously affected. If channels 2 to 6 cannot be aligned for proper response adjust A26 thru A30. These slugs are accessible thru hole in rear of tuner.
			201MC (20MC Swp)	199.25MC 203.75MC	11			
			195MC (20MC Swp)	193.25MC 197.75MC	10			
			189MC (20MC Swp)	187.25MC 191.75MC	9			
			183MC (20MC Swp)	181.25MC 185.75MC	8			
			177MC (20MC Swp)	175.25MC 179.75MC	7			
			85MC (20MC Swp)	83.25MC 87.75MC	6			
			79MC (20MC Swp)	77.25MC 81.75MC	5			
			69MC (20MC Swp)	67.25MC 71.75MC	4			
			63MC (20MC Swp)	61.25MC 65.75MC	3			
			57MC (20MC Swp)	51.25MC 55.75MC	2			

40MC IF TRAP ALIGNMENT

Alignment of A31 will require adjustment only when local interference in the 40 to 45MC range occurs.
Tune in a station on which interference occurs and adjust A31 for minimum 40MC beat in picture.

UHF TUNER ALIGNMENT

Normally alignment of this portion of the receiver is not recommended in the field. It has been properly aligned at the factory and is very stable. Check VHF tuner and IF stages for proper alignment before attempting UHF alignment.

UHF IF ALIGNMENT

Remove the RF cable going from UHF to VHF tuner.
Connect bias to AGC as in VHF IF Alignment. AGC switch in "Medium" position.

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
13.	.001MFD	High side to point (F). Low side to chassis. (150Ω impedance)	44MC (10MC Swp)	45.75MC 42.5MC 41.25MC	Any UHF channel	Connect vert. amp. thru 47KΩ to point (A). Low side to chassis.	A32, A33, A34	Adjust for maximum response and curve similar to Fig. 1.

UHF RF ALIGNMENT

Connect RF cable going from UHF to VHF tuner, thru a 100Ω resistor.
Connect the synchronized sweep voltage from the sweep generator to the horizontal input of the oscilloscope for horizontal deflection.
Ground pin 2 of V1 to make UHF oscillator inoperative.
Set the fine tuning control to the mid-position of its range.

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
14.	Two 120Ω Carbon Resistors	Across UHF antenna terminals with 120Ω in each lead.	803MC (20MC Swp)	801.25MC 805.75MC	69	Vert. Amp. across 100Ω which was added in series with UHF to VHF RF cable	A35, A36	The position of markers must be within bandpass as in Fig. 6.
15.	"	"	473MC (20MC Swp)	471.25MC 475.75MC	14	"	"	Adjust for response curve similar to Fig. 6. Make compromise by adjustments of A35 and A36 for correct bandpass. Turn back to channel 69 and recheck response curve on its frequency.

ALIGNMENT INSTRUCTIONS (cont)

UHF OSCILLATOR ALIGNMENT

Connect bias as in VHF IF Alignment. AGC switch in medium position.
Set fine tuning control for 50% position of marker range.
The sweep generator output lead should be terminated with its characteristic impedance, usually 50 ohms.
Tuner switch to UHF position and remove knobs. The UHF channel oscillator adjustment screws are reached thru a hole just above and slightly to the left of the channel switch shaft.
The correct adjustment screw is accessible thru this hole as the channel switch is turned to each channel strip.
Connect the synchronized sweep voltage from the sweep generator to the horizontal input of the oscilloscope for horizontal deflection.
The sweep generator output lead should be terminated with its characteristic impedance, usually 50 ohms.
Set the fine tuning control to the mid-position of its range.

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
16.	Two 120Ω Carbon Resistors	Across UHF antenna terminals with 120Ω in each lead.	473MC (10MC Swp)	471.25MC 475.75MC	14	Vert. Amp. thru 47KΩ to point (A). Low side to chassis.	A37	Adjust to place sound markers in trap notch as in Fig. 4. Video marker should be at 50%.
			515MC (10MC Swp)	513.25MC 517.75MC	21		A38	
			575MC (10MC Swp)	573.25MC 577.75MC	31		A39	
			635MC (10MC Swp)	633.25MC 637.75MC	41		A40	
			695MC (10MC Swp)	693.25MC 697.75MC	51		A41	
			755MC (10MC Swp)	753.25MC 757.75MC	61		A42	
			815MC (10MC Swp)	813.25MC 817.75MC	71		A43	
			875MC (10MC Swp)	873.25MC 877.75MC	81		A44	

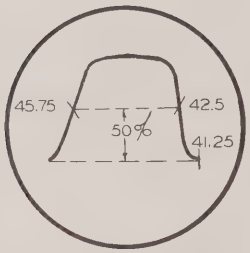


FIG. 1

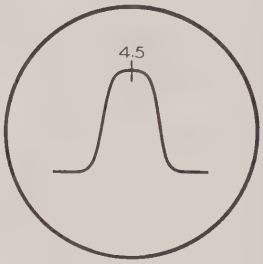


FIG. 2

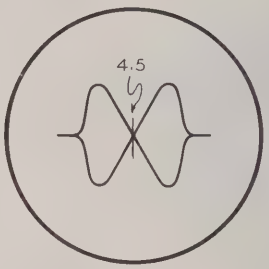


FIG. 3

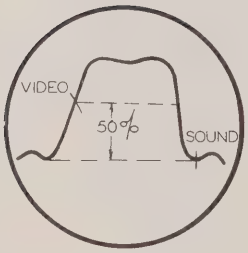


FIG. 4

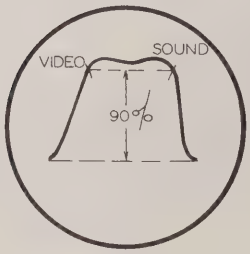


FIG. 5

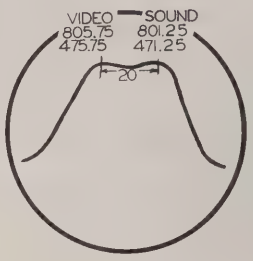
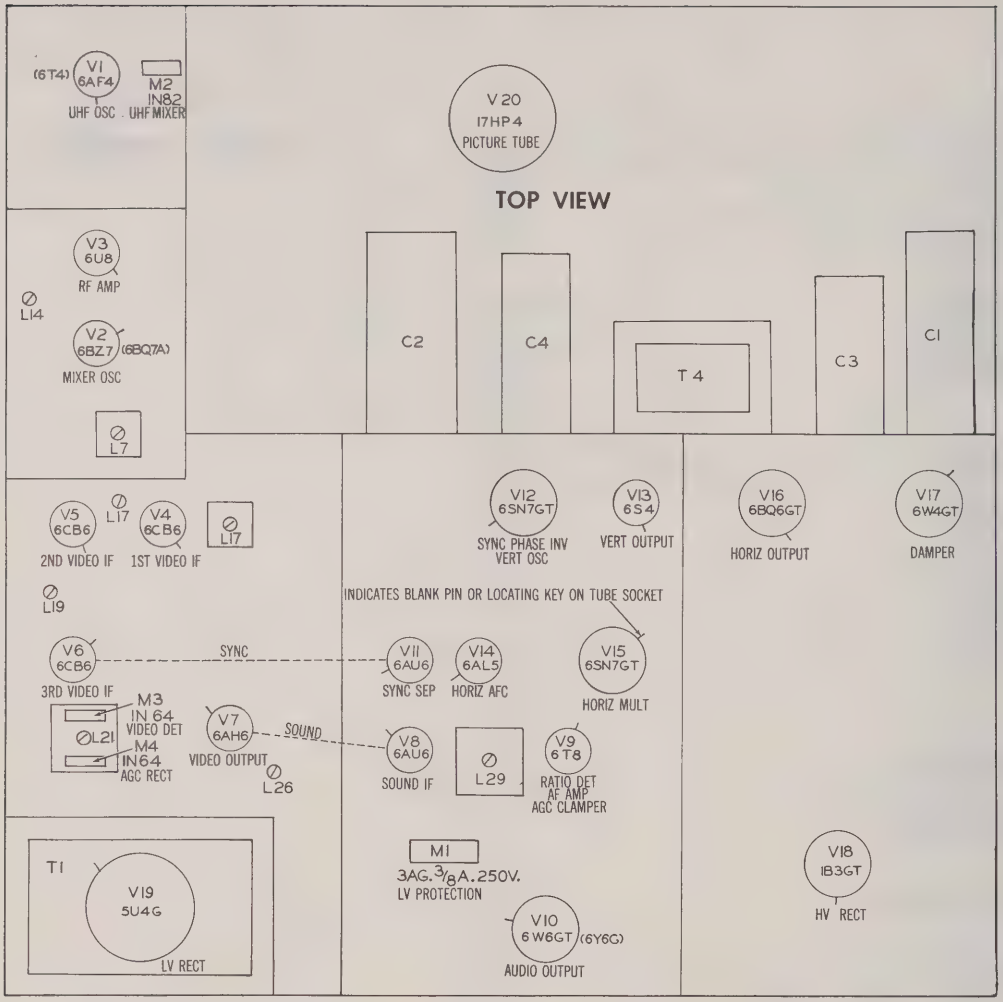


FIG. 6

TUBE PLACEMENT CHART



TUBE FAILURE CHECK CHART

The following chart lists tubes whose failures are most likely to produce the indicated symptoms. Refer to tube placement chart for location and type of tube.

POWER SUPPLY FAILURE
No raster, no sound - **V19, Fuse (M1)**

LOSS OF PICTURE OR SOUND
No pic, no sound, has raster - **V3, V4, V5, V6, V7, V10 (V1 UHF only)**
No pic, no sound, has snow - **V2, V3, V4**
No pic, has sound, has raster - **V7, V20**
Has pic, no sound - **V8, V9, V10**
Overloaded picture - **V9**

SYNC FAILURE
No vert. sync - **V12**
No horiz. sync - **V12, V14, V15**
No vert. or horiz. sync - **V11, V12**

SWEEP FAILURE
No raster, has sound - **V15, V16, V17, V18, V20**
No vertical deflection - **V12, V13**
Poor vert. linearity or foldover - **V12, V13**
Poor horiz. linearity or foldover - **V15, V16, V17**
Narrow picture - **V15, V16, V17, V18, V19**
Vert. off freq. - **V12**
Horiz. off freq. - **V12, V14, V15**

RESISTANCE MEASUREMENTS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8	Pin 9
V 1	6AF4	■♦4KΩ	10KΩ	.1Ω	0Ω	0Ω	10KΩ	■♦4KΩ		
V 2	6BZ7	♦700Ω	♦120KΩ	INF	0Ω	.1Ω	INF	1.2Meg	0Ω	0Ω
V 3	6U8	♦3.3KΩ	200KΩ	♦100KΩ	.1Ω	0Ω	♦8.2KΩ	0Ω	0Ω	10KΩ
V 4	6CB6	850KΩ	47Ω	.1Ω	0Ω	♦150Ω	♦150Ω	0Ω		
V 5	6CB6	850KΩ	47Ω	.1Ω	0Ω	♦150Ω	♦150Ω	0Ω		
V 6	6CB6	.1Ω	150Ω	.1Ω	0Ω	♦560Ω	♦560Ω	0Ω		
V 7	6AH6	550KΩ	70Ω	.1Ω	0Ω	†5.7KΩ	†39KΩ	70Ω		
V 8	6AU6	180KΩ	30KΩ	30KΩ	30KΩ	†1.1KΩ	†1.1KΩ	30KΩ		
V 9	6T8	INF	12.5KΩ	INF	.1Ω	0Ω	750KΩ	0Ω	6.8Meg	†220KΩ
V 10	6W6GT	INF	30KΩ	†500Ω	†300Ω	230KΩ	230KΩ	30KΩ	30KΩ	
V 11	6AU6	850KΩ	0Ω	.1Ω	0Ω	♦220KΩ	♦47KΩ	0Ω		
V 12	6SN7GT	♦220KΩ	♦6.5KΩ	5.1KΩ	1.6Meg	▲1.2Meg	0Ω	0Ω	.1Ω	
V 13	6S4	INF	1.8KΩ	2.2Meg	.1Ω	0Ω	2.2Meg	INF	INF	▲4.5KΩ
V 14	6AL5	100KΩ	100KΩ	.1Ω	0Ω	4.8Meg	INF	4.8Meg		
V 15	6SN7GT	180KΩ	†82KΩ	820Ω	5.2Meg	†5.7KΩ	820Ω	.1Ω	0Ω	
V 16	6BQ6GT	INF	.1Ω	INF	♦560Ω	390KΩ	INF	0Ω	0Ω	Top Cap ▲17Ω
V 17	6W4GT	INF	INF	550KΩ	INF	†80Ω	INF	550KΩ	550KΩ	
V 18	1B3GT		PINS	1 - 8	HAVE	INFINITE	RESISTANCE			Top Cap ▲160Ω
V 19	5U4G	INF	50KΩ	INF	26Ω	INF	28Ω	INF	50KΩ	
V 20	17HP4	0Ω	1.5KΩ	Pin 6 0Ω	Pin 10 ▲220KΩ	Pin 11 ♦240KΩ	Pin 12 .1Ω			

■ MEASURED IN "UHF" POSITION
♦ MEASURED FROM 130V LINE
† MEASURED FROM PIN 2 OF V19
▲ MEASURED FROM PIN 3 OF V17

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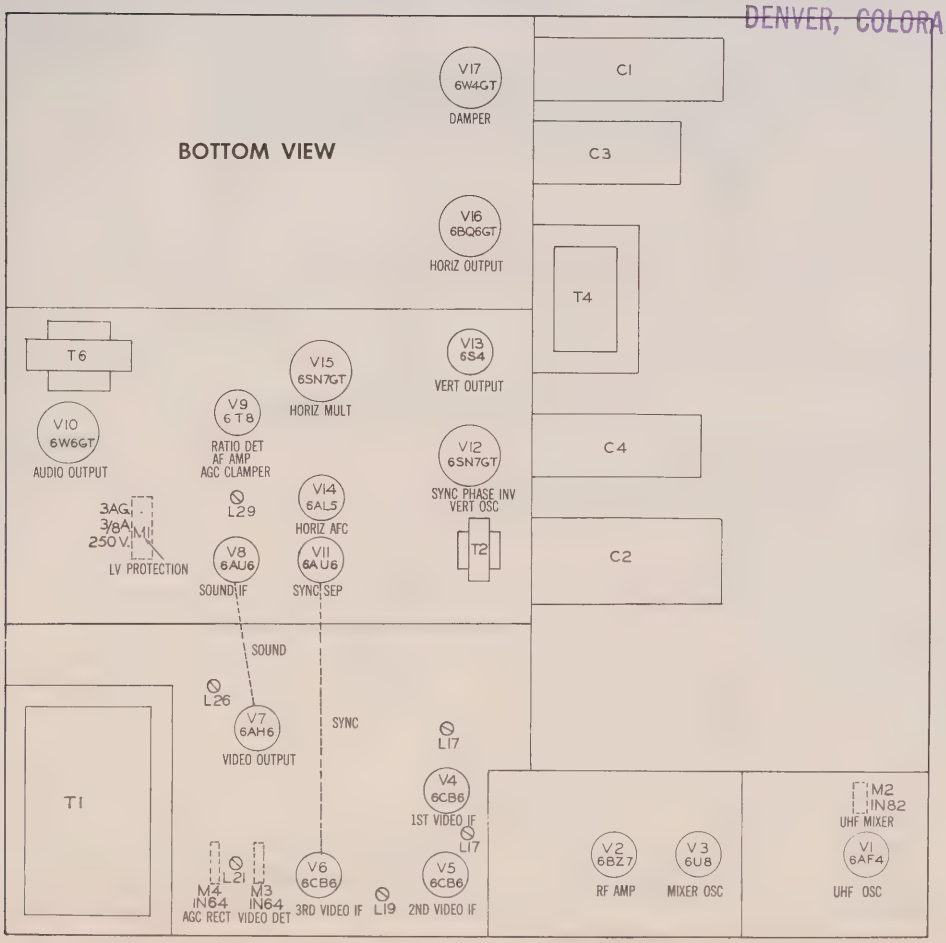

TUBE PLACEMENT CHART

SET 272 FOLDER 2

TROUBLE SHOOTING AIDS

SWEEP

HORIZONTAL

LOSS OF SWEEP

Follow procedure outlined under "Loss of High Voltage".

INSUFFICIENT SWEEP

Check by substitution V16, V17 and V19. Check T3, T5A, R93, R90, C80, C81 and other associated components.

DRIVE LINES

Check by substitution V16 and V17. Check C80, C81, R90, R93, T3, T5A and other associated components.

COMPRESSED LEFT SIDE

Check by substitution V16 and V17. Check horizontal output and damper stages for component failure or change of value.

FOLDS

Follow procedure outlined under "Drive Lines".

PIE CRUST EFFECT

Check by substitution V15, V16 and V17. Check C76 for open. Check L30, C79, C75 and other associated components.

XMAS TREE EFFECT

Check by substitution V15, V16 and V17. Check T3 and T5A for internal arcing. Check L30, C79, C74, R86, R87, R90 and other associated components.

VERTICAL

LOSS OF SWEEP

Check by substitution V12 and V13. Check waveform W7.

If Satisfactory	If Unsatisfactory
Check T4, T5B, C2C, R73, and other associated components.	Check T2, C70, R77, R74, R69, R3 and other associated components.

INSUFFICIENT SWEEP

Check by substitution V12 and V13. Check height and vertical linearity controls for proper operation. Check T4, T5B, R69 and other associated components.

COMPRESSED AT BOTTOM

Check by substitution V12 and V13. Check R3, R69, C3A, C3B and other associated components.

COMPRESSED AT TOP

Check by substitution V12 and V13. Check C70, C2C, C3B, R73, R2, T4 and other associated components.

FOLDS

Check by substitution V12 and V13. Check C69, R70, R71, T4, T5B and other associated components.

SYNC

LOSS OF VERTICAL AND HORIZONTAL SYNC

Check by substitution V11 and V12. Check C65, C64, R61, R59, R65, R64 and other associated components.

LOSS OF VERTICAL SYNC - HORIZONTAL SYNC SATISFACTORY

Substitute V12. Check vertical integrator network. Check C68, T2, R4, R67, R68 and other associated components.

LOSS OF HORIZONTAL SYNC - VERTICAL SYNC SATISFACTORY

Check by substitution V14 and V15. Check horizontal AFC network. Check L30, C79, C75, R87, R81 and other associated components.

HORIZONTAL BENDING

Check by substitution V10, V11, V12, V14 and V15. Check horizontal AFC network.

VIDEO

LOSS OF VIDEO

Substitute V7. Check R39, R38, L27, L25, C48, C47, C2D and other associated components.

SOUND BARS (4.5MC Beat)

Adjust tuner fine tuning for best sound and picture. Check adjustment A9. Check video IF alignment.

POOR CONTRAST

Substitute V7. Check contrast control. Check picture tube. Check C46, C48, L27 and other associated components.

NEGATIVE PICTURE

Substitute V7. Check picture tube. Check video crystal detector. Check C46, C48 and other associated components.

SMEAR

Substitute V7. Check L23, L24, L25, L27, C46, C48 and other associated components.

WIDE BLACK BAR ACROSS PICTURE

Check by substitution V2, V4, V5, V6 and V7 for heater to cathode leakage.

AUDIO

WEAK OR NO SOUND

Check by substitution V8, V9 and V10, Check stages V9 and V10 using audio signal generator. Apply signal across R1B.

If Satisfactory	If Unsatisfactory
Check ratio detector and audio IF stages for component failure or change of value.	Check C57, C58, C59, C61, C62, C63, R53, R48, T6, speaker and other associated components.

BUZZ

Adjust tuner fine tuning for best sound and picture. Check adjustment A8. If still unsatisfactory, check audio IF alignment.

DISTORTED

Follow procedure outlined under "Weak or No Sound".

POWER

DEAD SET

If filaments fail to light, check AC interlock assembly. Check switch on volume control and T1. If filaments light, substitute V10 and V19. Check B+ filter and decoupling network.

SMALL AND/OR DIM PICTURE

Substitute V19. Check B+ filter and decoupling network.

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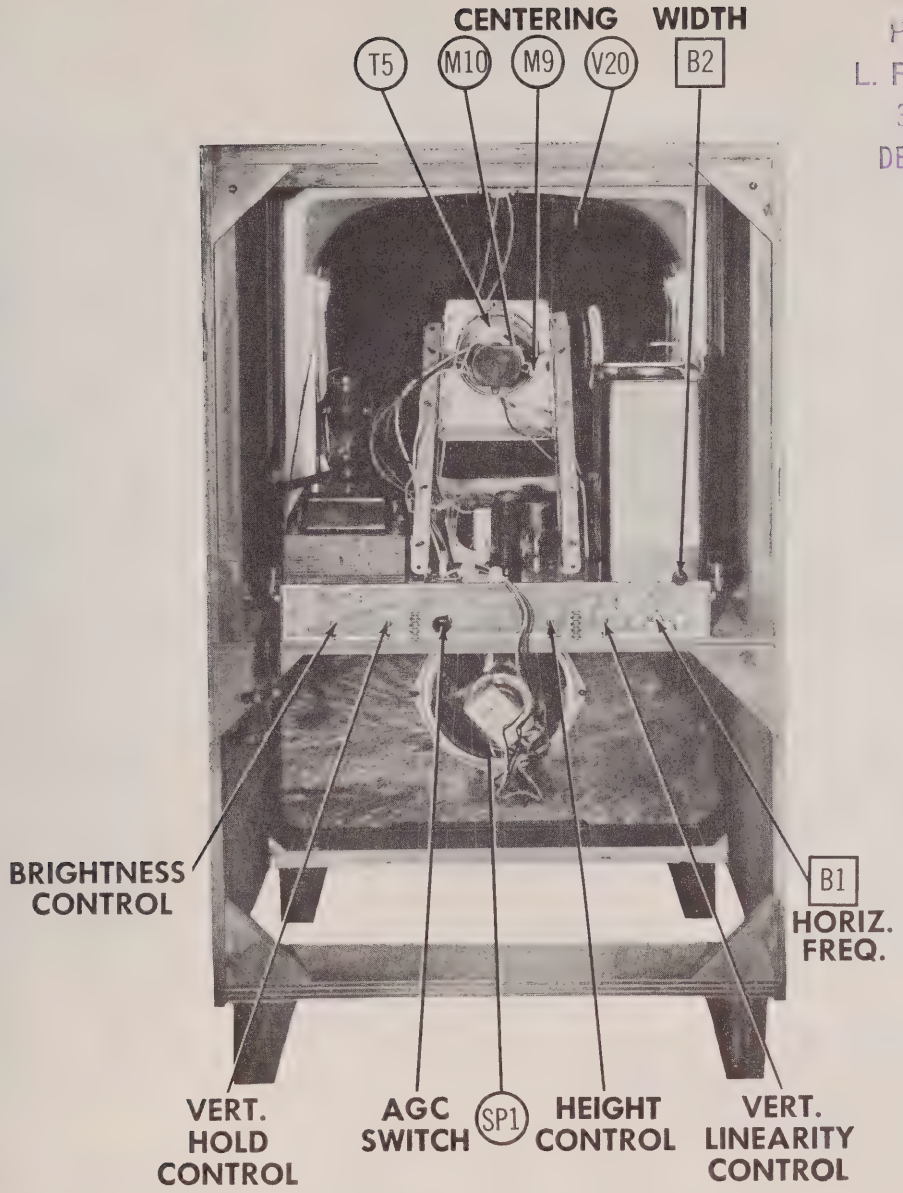

CABINET—REAR VIEW

HORIZONTAL SWEEP CIRCUIT ADJUSTMENTS

Turn the set on and tune in a TV station, preferably a test pattern.

Adjust the horizontal hold control (B1) until the picture falls into sync. Remove the signal by switching off channel then back again. If receiver fails to hold sync reset B1 slightly.

Set the horizontal size adjustment B2 for a picture slightly wider than necessary to fill the picture mask horizontally.

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DENVER, COLORADO

PARTS LIST AND DESCRIPTIONS

TUBES (SYLVANIA, GENERAL ELECTRIC, WESTINGHOUSE)

ITEM No.	USE	REPLACEMENT DATA: AIR LINE PART No.	STANDARD REPLACEMENT	RETMA BASE TYPE	NOTES
V1	UHF Oscillator	6AF4	6AF4	TDE	⑦4 used as an alternate
V2	RF Amplifier	6BZ7	6BZ7	9AJ	6BQ7A used as an alternate
V3	Osc.-Mixer	6U8	6U8	9AE	
V4	1st. Video IF Amp.	6CB6	6CB6	TCM	
V5	2nd. Video IF Amp.	6CB6	6CB6	TCM	
V6	3rd. Video IF Amp.	6CB6	6CB6	TCM	
V7	Video Output	6AB8	6AB8	TBK	
V8	Sound IF Amp.	6AU6	6AU6	TBK	
V9	Ratio Det.-AF Amplifier-AGC Clamper	6T8	6T9	8K	
V10	Audio Output	6W6GT	6W6GT	8CB	6T9Q used as an alternate
V11	Sync Separator	6AU8	6AU8	TBK	
V12	Sync Phase Inv.-Vert. Osc.	6BN7GT	6BN7GT	8BD	
V13	Vert. Output	6S4	6S4	8AC	
V14	Horiz. AFC	6AL5	6AL5	6BT	
V15	Horiz. Mult.	6BN7GT	6BN7GT	8BD	
V16	Horiz. Output	6BQ6GT	6BQ6GT	8AM	
V17	Damper	6W4GT	6W4GT	4CG	
V18	HV Rectifier	1B3GT	1B3GT	3C	
V19	LV Rectifier	5U4G	5U4G	5T	

CATHODE-RAY TUBE

ITEM No.	REPLACEMENT DATA: AIR LINE PART No.	CBS-HYTRON PART No.	GENERAL ELECTRIC PART No.	SYLVANIA PART No.	WESTINGHOUSE PART No.	RETMA BASE TYPE	NOTES
V20	17EP4 / 17RP4	17EP4 / 17RP4	17EP4 / 17RP4	17EP4 / 17RP4	17EP4 / 17RP4	12L	① Aluminized
	17EP4B ①					12L	

CAPACITORS

Capacity values given in the rating column are in mfd. for Electrolytic and Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING: CAP.	RATING: VOLT	REPLACEMENT DATA: AIR LINE PART No.	CENTRALAB PART No.	ERIE PART No.	MALLORY PART No.	PYRAMID PART No.	SANGAMO PART No.	NOTES
C1A	▲40	400	M-8969			FP947	TM-B04020-450	T-150	
B	▲100	400							
C2A	▲80	200				TM-4106		C-415	
B	▲40	300	M-8967		FP453			FM-3540	
C	▲100	50							
D	10	400							
C3A	▲20	450		TCZ-6.8	NP0K-8R8	FP231	TM-D10-450	D-300	
B	▲10	450		829-5	3125-01-GR5				
C4	▲100	200				FP129.1	TM-100-200		
C5	50	50	M-6913			TC44	TD-H-150	FM-1518	
C6A	1.0								
B	20								
C7	1.1								
C8	500		13M-12K-80U	MFT-1000					
C9	700		13M-33K-80U	MFT-100					
C10	10		13M-20A100DN1						
C11	6.8		13L&C-6R8N	TCZ-6.8	NP0K-6R8			ZT-5568	
C12	5-3			829-5	3125-01-GR5			CT-565A	
C13	1500		13L-45A-152Z	DD-152	501-001S			C-5215	
C14	3		13L&C-S3CB	TCZ-3	NP0K-300			ZT-553	
C15	900		13M-23K-80U	MFT-1000					
C16	5-3			829-5	3125-01-GR5			CT-565A	
C17	47		13L-SQ-470K	D6-470	GP1K-470			UC-5447	
C18	800		13M-23K-80U	MFT-1000					
C19	1.5		13L-SC-1R5C						
C20	800		13M-23K-80U	MFT-1000					
C21	47		13M-30U470X3						
C22	5-3			829-5	3125-01-GR5			CT-565A	
C23	10		13L-SU-100F	TCW-10	NP70K-100			WT-541	
C24	5-3			829-3	3125-01-GR5			CT-565A	
C25	5		13L-SUA-050C						
C26	800		13M-23K-80U	MFT-1000					
C27	1500		13L-45A-152Z	DD-152	501-001S		DC-5215		
C28	220		13L-12D-221K	DD-221	501-221		UC-5323		
C29	1500		13L-45A-152Z	DD-152	501-001S		DC-5215		
C30	68		13L-12U-680H	TCH-68	N750K-680				
C31	100			D6-101	GP1K-101		UC-531		
C32	5000		M-6372	DD-502	501-005		DC-525	C-1250	
C33	1000			DD-102	511-01		DC-511	K-1210	
C34	5000		M-6372	DD-502	501-005		DC-525	C-1250	
C35	4.7			TCZ-4.7	NP0K-4R7		DC-5547		Note 1
C36	7000			DD-502	501-005		DC-525	C-1250	
C37	1000			DD-102	951-001		DC-531	K-1210	
C38	5000		M- 6372	DD-502	501-005		DC-525	C-1250	
C39	.25	300				FP4035	IMP2-P25	3302025	
C40	4.7			TCZ-4.7	NP0K-4R7		DC-5547		Note 1
C41	1000			DD-102	501-001		DC-531	K-1210	
C42A	4000		M-7774	DD1-402	823-004		DC-524		
B	4000								
C43	5000		M-6372	DD-502	501-005		DC-525	C-1250	
C44	.25	300				FP4035	IMP2-P25	3302025	
C45	10			TCZ-10	NP0K-100		ZT-541	K-1410	
C46	.1	300		DF-104			PT401	IMP2-P1	330201
C47	33		M-8949	TCZ-33	NP0K-330				KR-1452
C48	.1	400		DF-104			PT401	IMP4-P1	330401
C49	4.7			TCZ-4.7	NP0K-4R7		ZT-5547		
C50	47			TCZ-47	NP0K-470				KR-1447
C51	68			TCZ-68	NP0K-680				KR-1468
C52	5000		M-6372	DD-502	501-005		DC-525	C-1250	
C53	10000		M-9062	DD-103	511-01		DC-511		
C54	560	300	M-7780						KR-1356
C55	3900		M-9059	D6-392	GP3-333-39S		UC-5339	C-1239	
C56	10000		M-9062	DD-103	511-01		DC-511	IMP6-S1	330611

PARTS LIST AND DESCRIPTIONS

CAPACITORS (cont)

ITEM No.	RATING: CAP.	RATING: VOLT	REPLACEMENT DATA: AIR LINE PART No.	CENTRALAB PART No.	ERIE PART No.	MALLORY PART No.	PYRAMID PART No.	SANGAMO PART No.	NOTES
C57	5000		N-6372	DD-502	801-005	DC-525	IMP5-S5	C-1250	
C58	100			TCZ-100	NP0K-101	ZT-531		KR-1310	
C59	.01	400		DF-103		PT403	IMP4-S3	330403	
C60	.05	300		DF-503		PT415	IMP2-S5	330215	
C61	5000		N-6372	DD-502	801-005	DC-525		C-1250	
C62	.05	600	N-9046			PT413	IMP6-S15	330615	
C63	5000		N-6372	DD-502	801-005	DC-525		C-1250	
C64	5000		N-6372	DD-502	801-005	DC-525		C-1250	
C65	220			DF-221	GP2K-221	UC-5323		K-1322	
C66	22		N-9049	TCZ-22	NP0K-220			KR-1423	
C67A	2000						IMP6-S2	C-1220	
B	5000		⊕N-8043	⊕PC-100	⊕1405-01		IMP5-S5	C-1250	
C	5000						IMP6-S5	C-1250	
C68	4700	500	N-6893			MCB465		CR-1247	
C69	.1	400	N-9283	DF-104		PT401	IMP4-P1	330401	
C70	.1	400		DF-104		PT401	IMP4-P1	330401	
C71	5000		N-6372	DD-502	801-005	DC-525		C-1250	
C72	1100	500	N-7783					C-1211	
C73	1100	500	N-7783					C-1211	
C74	.0047	600	N-9061	DD-472	GP3-333-472	PT6347	IMP6-D47	3306247	
C75	.01	600		D6-103	GP3-333-103	PT413	IMP6-S1	330611	
C76	.05	200		DF-503		PT415	IMP2-S5	330215	
C77	220	500	N-9054					KR-1322	
C78	330	500	N-9056					KR-1333	
C79	.0039	600	N-9060			MCK463		CK-1239	
C80	560	500	N-9057					KR-1356	
C81	1100	500	N-7783					CR-1211	
C82	1000	1000	N-8066						
C83	.1	200		DF-104		PT401	IMP2-P1	330201	
C84	.25	400				PT4025	IMP4-P25	3304025	
C85	.1	200		DF-104		PT401	IMP2-P1	330201	
C86	43	2000	N-9052						
C87	500	20000	N-8041	TY3-502	413	HV20035B			
C88	.01	600	N-9439	D6-103	GP3-333-103	PT611	IMP6-S1	330611	
C89	.01	600	N-9439	D6-103	GP3-333-103	PT611	IMP6-S1	330611	
C90	5000			DD-502	811-005	DC-525		C-1250	Note 2

* Items C67A, C67B, C67C, R66A, R66B, R66C are combined in one unit.
Note 1, Not used in Models GSL-3164B and GSL-3183B.
Note 2. Not used in Models GSL-3164A and GSL-3183A.

CONTROLS

ITEM No.	RATING: RESISTANCE	RATING: WATTS	REPLACEMENT DATA: AIR LINE PART No.	IRC PART No.	CLAROSTAT PART No.	CENTRALAB PART No.	MALLORY PART No.	INSTALLATION NOTES
R1A	2500Ω		M-9777	*QF-521	R-TV-500	F1-15	UF252R	Contrast - Panel
B	500Ω					R2-41	UH55A	Volume - Rear
C	Switch					K3-	US-38	Attach to R1B
R2A	5000Ω		M-8945	QU-124	A47-5000-S	AB-10	SU-16	Vert. Linearity
B	Shaft		Not Req.	Not Req.	FKS-1/4	AK-1	Not Req.	Attach to R2A
R3A	1.5Meg		M-8971	QU-339	A47-2.5Meg-S	AB-53	SU-565	Height
B	Shaft		Not Req.	Not Req.	FKS-1/4	AK-1	Not Req.	Attach to R3A
R4A	1Meg		M-8948	QU-137	A47-1Meg-S	AB-89	SU-54	Vert. Hold
B	Shaft		Not Req.	Not Req.	FKS-1/4	AK-1	Not Req.	Attach to R4A
R5A	1MΩ		M-8944	QU-138	A47-1MΩ-S	AB-60	SU-41	Brightness
B	Shaft		Not Req.	Not Req.	FKS-1/4	AK-1	Not Req.	Attach to R5A

* CONCENTRIKIT EQUIVALENT : KIT K-2 BASE ELEMENTS & SHAFTS B17-111 & P1-123 (Panel)
B13-153 & R9-214 (Rear)
76-1 SWITCH

RESISTORS

ITEM No.	RATING: OHMS	RATING: WATT	REPLACEMENT DATA: AIR LINE PART No.	IRC PART No.	NOTES
R6	10KΩ	½		BTS-10K	
R7	1000Ω	½		BTS-1000	
R8	4700Ω	½		BTS-4700	
R9	47KΩ	½		BTS-47K	
R10	32KΩ	½		BTS-32K	
R11	270KΩ	½		BTS-270K	
R12	680Ω	½		BTS-680	
R13	180KΩ	½		BTS-180K	
R14	15KΩ	½		BTS-15K	
R15	100KΩ	½		BTS-100K	
R16	100KΩ	½		BTS-100K	
R17	100KΩ	½		BTS-100K	
R18	8200Ω	½		BTS-8200	
R19	10KΩ	½		BTS-10K	
R20	330Ω	½		BTA-330Ω	
R21	33KΩ	½		BTS-33K	
R22	1000Ω	½		BTS-1000	
R23	1000Ω	½		BTS-1000	
R24	47Ω	½		BTS-47	
R25	150Ω	½		BTS-150	
R26	1000Ω	½		BTS-1000	
R27	18KΩ	½		BTS-18K	
R28	47Ω	½		BTS-47	
R29	150Ω	½		BTS-150	
R30	150Ω	½		BTS-150	
R31	56Ω	½		BTS-56Ω	
R32	820KΩ	½		BTS-820K	
R33	820KΩ	½		BTS-820K	
R34	6800Ω	½		BTS-6800	
R35	4.7Meg	½		BTS-4.7Meg	
R36	560KΩ	½		BTS-560 K	
R37	47Ω	½		BTS-47	Note 1
R38	39KΩ	1		BTA-39K	Note 2
R39	560Ω	1		BTA-560Ω	Note 3
R40	150KΩ	½		BTS-150K	
R41	1000Ω	½		BTS-1000	
R42	39KΩ	½		BTA-39K	
R43	39KΩ	½		BTS-39Ω	

ITEM No.	RATING: OHMS	RATING: WATT	REPLACEMENT DATA: AIR LINE PART No.	IRC PART No.	NOTES
R44	15KΩ	½		BTS-15K	
R45	33Ω	½		BTS-33Ω	
R46	12KΩ	½		BTS-12K	
R47	6.8Meg	½		BTS-6.8Meg	
R48	220KΩ	½		BTS-220K	
R49	330KΩ 5%	½	N-9041	BTS-330K 5%	
R50	180KΩ 5%	½		BTS-180K 5%	
R51	18KΩ	½	N-7401	BTS-18K	
R52	100KΩ	½		BTS-100K	
R53	120Ω	½			
R54	10KΩ	½		BTS-10K	
R55	560KΩ	½		BTS-560K	
R56	560KΩ	½		BTS-560K	
R57	560KΩ	½		BTS-560K	Note 4
R58	47KΩ	½		BTS-47K	
R59	8.2Meg	½	N-9810	BTS-8.2Meg	
R60	15KΩ	½		BTS-15K	
R61	220KΩ	½		BTS-220K	
R62	3900Ω	½		BTS-3900	
R63	2000Ω	½		BTS-2000	
R64	1800Ω	½		BTS-1800	
R65	4700Ω	½		BTS-4700	
R66A	22KΩ	½		BTS-22K	
B	8200Ω	½	⊕N-8043	BTS-8200	
C	1500Ω	½		BTS-8200	
R67	1Meg	½		BTS-1Meg	
R68	15KΩ	½		BTS-15K	
R69	390KΩ	½		BTS-390K	
R70	2700Ω	½		BTS-2700	
R71	1500Ω	½		BTS-1500	
R72	2.2Meg	½		BTS-2.2Meg	
R73	820Ω	½		BTA-820	
R74	56KΩ	½		BTS-56K	
R75	56Ω	½		BTS-56	
R76	56Ω	½		BTS-56	
R77	2700Ω	½		BTS-2700	
R78	220KΩ	½		BTS-220K	
R79	1Meg	½		BTS-1Meg	Note 5

RESISTORS

ITEM No.	RATING: OHMS	RATING: WATT	REPLACEMENT DATA: AIR LINE PART No.	IRC PART No.	NOTES
R80	10KΩ	½		BTS-10K	
R81	100KΩ	½		BTS-100K	
R82	100KΩ	½		BTS-100K	
R83	4.7MΩ	½		BTS-4.7Meg	
R84	100KΩ	½		BTS-100K	
R85	470KΩ	½		BTS-470K	
R86	820Ω	½		BTA-5600	
R87	560Ω	½		BTS-560K	
R88	180KΩ	½		BTS-180K	
R89	82KΩ	½		BTS-82K	
R90	8200Ω	½		BTS-8200	
R91	100Ω	½		BTS-100	

ITEM No.	RATING: OHMS	RATING: WATT	REPLACEMENT DATA: AIR LINE PART No.	IRC PART No.	NOTES
R92	390KΩ	½		BTS-390K	
R93	560Ω	½		BTS-560	
R94	150KΩ	½		BTS-150K	
R95	150KΩ	½		BTA-150K	
R96	4.3Ω	½	N-8125		
R97	470KΩ	½		BTA-470K	
R98	220KΩ	½		BTS-220K	Note 6
R99	470KΩ	½		BTS-470K	
R100	270KΩ	½		BTS-270K	
R101	470Ω	½		BTS-470	Note 1
R102	1800Ω	½		BTA-1800	

* Items R66A, R66B, R66C, C67A, C67B, C67C are combined in one unit.
Note 1. Not used in Models GSL-3164C, GSL-3183C
Note 2. Models GSL-3164C and GSL-3183C use 33KΩ resistor in this application.
Note 3. Models GSL-3164B, C and GSL-3183B, C use 3.9KΩ resistor in this application.
Note 4. Not used in some versions.
Note 5. Models GSL-3164C and GSL-3183C use 470KΩ in this application.
Note 6. Models GSL-3164C and GSL-3183C use 100KΩ resistor in this application.

TRANSFORMER (POWER)

ITEM No.	RATING: PRI.	RATING: SEC. 1	RATING: SEC. 2	REPLACEMENT DATA: AIR LINE PART No.	Stancor PART No	Merit PART No	Triad PART No	RCA TYPE No	Halldorson PART No	Thordarson PART No
T1	117VAC @1.46A	575VCT @.210ADC	5VCT @ 3A	N-8935						
	SEC. 3	SEC. 4	SEC. 5							
	6.3VAC @1.2A	6.3VAC @1.5A	6.3VAC @6.6A							

TRANSFORMERS (SWEEP CIRCUITS)

ITEM No.	USE	REPLACEMENT DATA: AIR LINE PART No	Halldorson PART No	Merit PART No	RCA TYPE No	Ram PART No	Stancor PART No	Thordarson PART No	Triad PART No
T2	Vert. Osc.-Trans.	N-9002	D6702 ①	A-3003 ①	209T1 ①	V405 ①	A-8125 ①	24A87 ①	A-97K ①
T3	Horiz.Output Trans.	N-8926	F8W1 & RF600 ②③	232T1 & MWC-1 ④	212R1 ② ①	X112 ②		FLY-24 ① WC-18 ④ ①	D-35 & WC-12 ④
T4	Vert. Output Trans.	N-8957	S1B05 ⑦	A-3082 ⑦ ②	A-8140 ⑦ ②	V308 ⑦ ②	26S57 ⑦ ④	A-103K ⑦	
T5A	Yoke-Horiz.(24MS)	N-8930	DF803 ⑦	MDF-74 ⑦	214D1 ④	DY-30A ⑦ ②	Y70F25 ⑦ ③ ①	Y-11 ⑦ ①	Y-30-1 ⑦
B	Vert. (33MS)								

① Drill new mounting hole(s)
② Connect as auto transformer.
③ Use 50 to 1 turns ratio.
④ Use original yoke damping network.

*HORIZONTAL OUTPUT TRANSFORMER CONNECTION DATA

Use Original Width Coil Unless Replacement Type Is Listed

ORIGINAL TERMINAL Connections	Halldorson Replacement Connections	Merit Replacement Connections	RCA Replacement Connections	Ram Replacement Connections	Stancor Replacement Connections	Thordarson Replacement Connections	Triad Replacement Connections
Horiz. Out. Plate lead	9	9	10	13		9	10
3	5 or 7	5 or 7	6 or 7	4		5 or 7	6 or 7
2	4	4	5	2		4	5
1	1	1	1	10		1	1
Connect Width Coil Across	RF 600 Term. #4&#2 Across 3 & 1	MWC-1 Blue & red terms. across 2 & 1	212R1 Across 2 & 1			WC-18 Across 3 & 1	WC-12 Blue & red term. across 2 & 1
Special Notes		⑤					⑤ ⑥

⑤ Jumper terminals #2 and #3.
⑥ Jumper terminals #8 and "T".

TRANSFORMER (AUDIO OUTPUT)

ITEM No.	IMPEDANCE: PRI.	IMPEDANCE: SEC.	REPLACEMENT DATA: AIR LINE PART No	Stancor PART No	Merit PART No	Triad PART No	Halldorson PART No	Thordarson PART No	NOTES
T6	3.2KΩ	3.4Ω	N-8926	A-3949 ①	A-3018 ①	S-1X	Z1005	26S50 ①	① Drill new new mounting hole.

SPEAKER

ITEM No.	RATINGS: SIZE	RATINGS: FIELD	RATINGS: V. C. IMP.	REPLACEMENT DATA: AIR LINE PART No.	JENSEN PART No.	OUAM PART No.	NOTES
SP1	8"	8W	3.4Ω	N-8926		BE815	

MODELS GSL-3164A, B, C, GSL-3183A, B, C
AIRLINE

PARTS LIST AND DESCRIPTIONS (Continued)

COILS (RF-IF)

ITEM No.	USE	DC RES.		REPLACEMENT DATA				NOTES
		PRI.	SEC.	AIRLINE PART No.	MEISSNER PART No.	MERIT PART No.	MILLER PART No.	
L1	UHF Ant. Coil	0Ω						
L2	UHF Ant. Coil	0Ω						
L3	UHF Ant., Mixer, Osc. Coils	0Ω						
L4	RF Choke	0Ω						
L5	Cathode Choke	0Ω						
L6	Fil. Choke	0Ω						
L7	VHF Ant. Coils	0Ω CT	0Ω					
L8	Neut. Coil	0Ω						
L9	VHF RF, Mixer Grid & Osc. Coils	0Ω						
L10	UHF IF Interstage	.1Ω						
L11	UHF IF Interstage	.2Ω	.2Ω					
L12	UHF IF Interstage	.2Ω	.2Ω					
L13	Fil. Choke	0Ω						
L14	VHF Conv. Plate	.2Ω						
L15	Fil. Choke	0Ω		N-9807	19-1001		4604	1.4 Microhenries
L16	RF Choke	0Ω			19-1001		4604	1.6 Microhenries -Note 6
L17	1st. Video IF	0Ω	3.1Ω	N-9804				
L18	Fil. Choke	0Ω		N-9807	19-1001		4604	1.4 Microhenries
L19	2nd. Video IF	.1Ω	.1Ω	N-9805	17-4522		6219	Note 4
L20	Fil. Choke	0Ω		N-9825	19-1001		4604	1.4 Microhenries
L21	3rd. Video IF	.1Ω	.1Ω	N-9805	17-4523		6219	Note 4
L22	Fil. Choke	0Ω		N-9807	19-1001		4604	1.4 Microhenries
L23	Series Peaking Coil	2.6Ω		N-9250	19-3036	TV-180	6152	24 Microhenries, Note 3
L24	Series Peaking Coil	5Ω		N-9832	19-7047		4630	48 Microhenries
L25	Series Peaking Coil	9Ω		N-8933	19-3160 *	TV-184 *	4644*	155 Microhenries, wound on 5.6KΩ resistor - Note 1
L26	4.5MC Trap	3.8Ω		N-9011	20-1004	TV-151	1470	
L27	Shunt Peaking Coil	10Ω		N-8934		TV-185 *	4646 *	222 Microhenries, wound on 5.6KΩ resistor Note 2
L28	Sound IF	1.1Ω		N-7746	17-3400	TV-151	1469	
L29	Ratio Det.	8Ω	.6ΩCT	N-8928	17-1033 ■	TV-110 ■	1468 ■	Tertiary winding -.5Ω
L30	Horiz. Osc.	48Ω		N-8931	19-1576	TV-163	6210	
L31	Shunt Peaking Coil							464 Microhenries, Note 5

* Parallel with 5.6KΩ resistor.
■ Drill mounting holes.
Note 1. Models GSL-3164B, GSL-3183B use a 294 microhenries series peaking coil wound on 8.2KΩ resistor in this application.
Note 2. Models GSL-3164B, GSL-3183B use a 500 microhenries shunt peaking coil wound on 6.8KΩ resistor in this application.
Note 3. Models GSL-3164A, GSL-3183A only use 24 microhenries series peaking coil in this application.
Note 4. Models GSL-3164B, GSL-3183B use alternate part #R-1144.
Note 5. Models GSL-3164B, GSL-3183B use 464 Microhenries peaking coil in this application.
Note 6. Models GSL-3164A, GSL-3183A only use 1.6 microhenries RF choke in this application.

FUSES

ITEM No.	TYPE	RATING	REPLACEMENT DATA					
			AIRLINE PART No.		LITTELFUSE PART No.		BUSS PART No.	
			FUSE	HOLDER	FUSE	HOLDER	FUSE	HOLDER
M1	3AG	3/8A 250V	N-9660	N-9007	312.375 (3AG 3/8A)	357001	AGC 3/8	4405

CRYSTAL DIODES

ITEM No.	ORIG. TYPE	REPLACEMENT DATA			NOTES
		AIRLINE PART No.	SYLVANIA PART No.		
M2	1N82	31K-111	1N82 or 1N82A		UHF Mixer
M3	1N64		1N60 or 1N132		Video Detector
M4	1N64		1N60 or 1N132		AGC Rectifier

MISCELLANEOUS

ITEM No.	PART NAME	AIRLINE PART No.	NOTES
M5	Tuner	TV5519	VHF-UHF
M6	Trap	31K-225	VHF Ant. Input Filter
M7	Video Det. Assy.	N-9806	Includes M3, M4, Coils, Resistors & capacitors - Note 1
M8	Switch	N-9808	AGC- Alternate part #N-9823
M9	Centering Magnet	N-8939	
M10	Ion Trap	N-9012	
	Cabinet	407HF	Consolette - Models GSL-3183A, GSL-3183B, GSL-3183C
	Cabinet	435HF	Table model - Models GSL-3164A, GSL-3164B, GSL-3164C
	Knob	N-9816	Fine tuning
	Knob	N-9814	VHF tuning
	Knob	N-9815	UHF tuning
	Knob	N-9817	On-off-volume
	Knob	N-9818	Contrast
	Knob	N-9819	AGC Switch
	Safety Glass	N-9462	Models GSL-3183A, GSL-3183B, GSL-3183C
	Mask	N-9696	Models GSL-3183A, GSL-3183B, GSL-3183C
	Safety Glass	N-9463	Models GSL-3164A, GSL-3164B, GSL-3164C
	Mask	N-9693	Models GSL-3164A, GSL-3164B, GSL-3164C

Note 1. Models GSL-3164B, GSL-3164C, GSL-3183B, GSL-3183C use video detector assy part R-1142

TROUBLE SHOOTING AIDS (cont)

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HIGH VOLTAGE

LOSS OF HIGH VOLTAGE

Check by substitution V15, V16, V17, V18 and V10. Check waveform W14.

If Satisfactory	If Unsatisfactory
Check T3, T5A, C84, C83, R93 and other associated components.	Check C77, C79, C78, C81, R87, R89, L30 and other associated components.

INSUFFICIENT HIGH VOLTAGE

Check by substitution V16, V17 and V19, Check T3, R93, C81, C80 and other associated components.

BLOOMING

Check by substitution V16, V17, V18 and V19. Check R97, R93, R90, C95, C81 and other associated components.

GENERAL

RASTER, SOUND, NO PICTURE

Follow procedure outlined under "Loss of Video".

RASTER, PICTURE, NO SOUND

Follow procedure outlined under "Weak or No Sound".

RASTER, NO SOUND, NO PICTURE

Check by substitution V1, V2, V3, V4, V5, V6, V7 and V10. Check video IF components for failure or change of value.

NO RASTER, NO SOUND

Follow procedure outlined under "Dead Set".

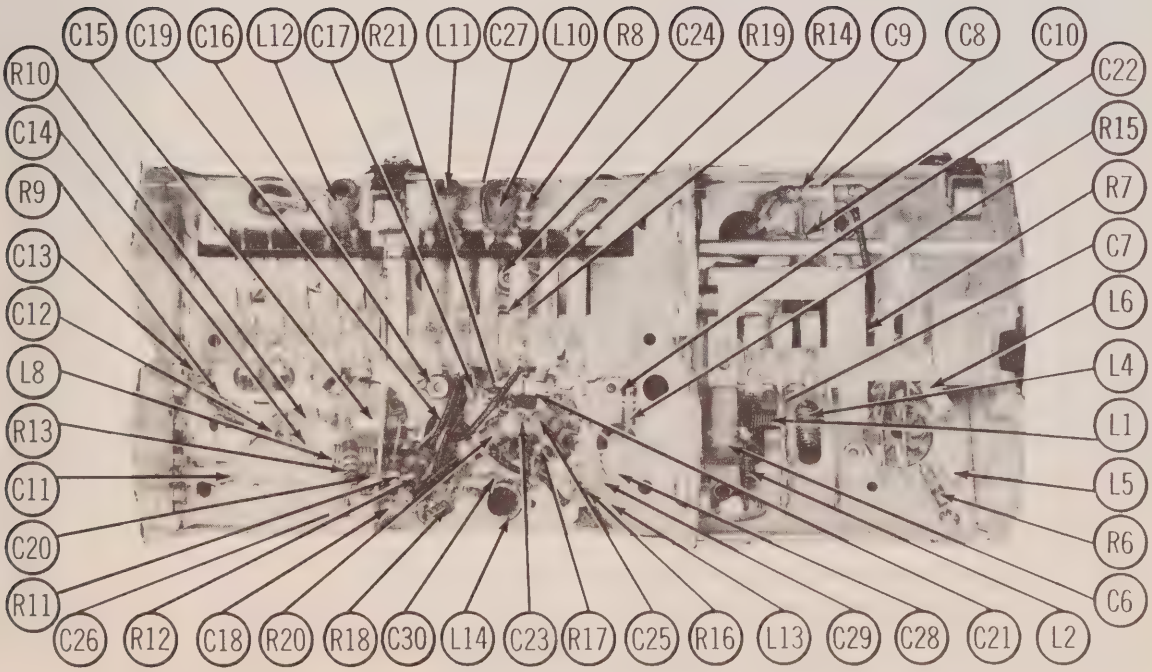
KEYSTONE EFFECT

Check T5 and its associated components.

INTERMITTENT STREAKS

Check high voltage section for corona discharge and arcing.

Symptoms shown are assumed and are not indicative of the quality and workmanship of this equipment.



TUNER BOTTOM VIEW

SERVICING IN THE FIELD

TUNER OSCILLATOR ADJUSTMENTS

Touch-up adjustment of the VHF tuner oscillator circuit may be accomplished as follows:

1. Set the selector knob to VHF position.
2. Tune in a TV station and set the fine tuning control to the center of its range.
3. Remove the channel selector and fine tuning knobs.
4. Adjustments are accessible one at a time thru the small hole above and slightly to the left of the channel switch shaft.

To adjust the UHF oscillator, set the channel selector knobs to the desired UHF channel. The fine tuning knob should be at the center of its range. Remove knobs and adjust the oscillator slug through the same hole as for VHF adjustments.

If two UHF channels are received and use the same UHF coil strips, the oscillator should be set for the channel closest to the center of the group.

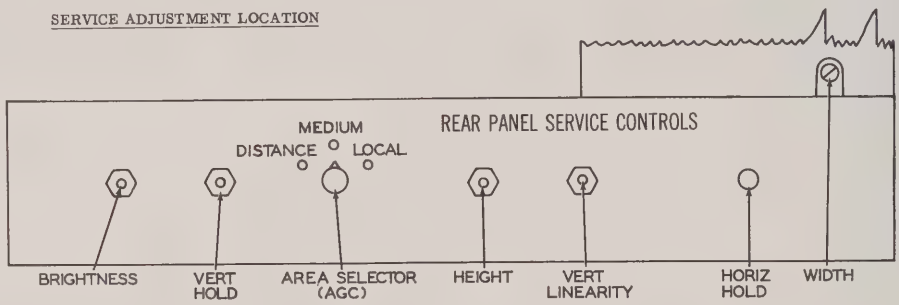
PICTURE TUBE SAFETY GLASS CLEANING

To clean safety glass, remove 3 wood screws holding wood strip at the top of safety glass. Remove wood strip and safety glass. Use extreme caution when removing safety glass.

PICTURE TUBE REMOVAL

For picture tube removal it is necessary to remove chassis. (See disassembly instructions.)

SERVICE ADJUSTMENT LOCATION



HORIZONTAL OSCILLATOR FIELD ADJUSTMENT

Adjustment of the horizontal oscillator circuit can be made from the rear panel of the chassis. Adjust the horizontal oscillator slug (L30) until picture synchronizes horizontally.

SOUND IF DETECTOR BUZZ ADJUSTMENT

To eliminate sound IF detector buzz, adjust the ratio detector secondary (L29) located on top of chassis. (See tube placement chart.)

FUSES

One fuse is used for LV Power Supply protection. (For location see tube placement chart.)

CENTERING

Centering is accomplished mechanically by adjusting a magnetic ring around the neck of picture tube located flush against the yoke. Turn the knurled (Disk Like) knob and at the same time rotate the ring around the tube until picture is properly centered.

DISASSEMBLY INSTRUCTIONS

NOTE: If it is necessary to remove the chassis for servicing, it is also necessary to remove the speaker. The speaker is the electro-magnetic type and must be connected for proper operation.

1. Remove 5 push-on type control knobs from front panel of cabinet.
2. Remove 2 metal screws from each antenna bracket.
3. Remove 5 wood screws. Remove rear cover.
4. Disconnect speaker plug. Remove 4 speaker nuts. Remove speaker.
5. Remove 5 chassis bolts. Remove chassis.

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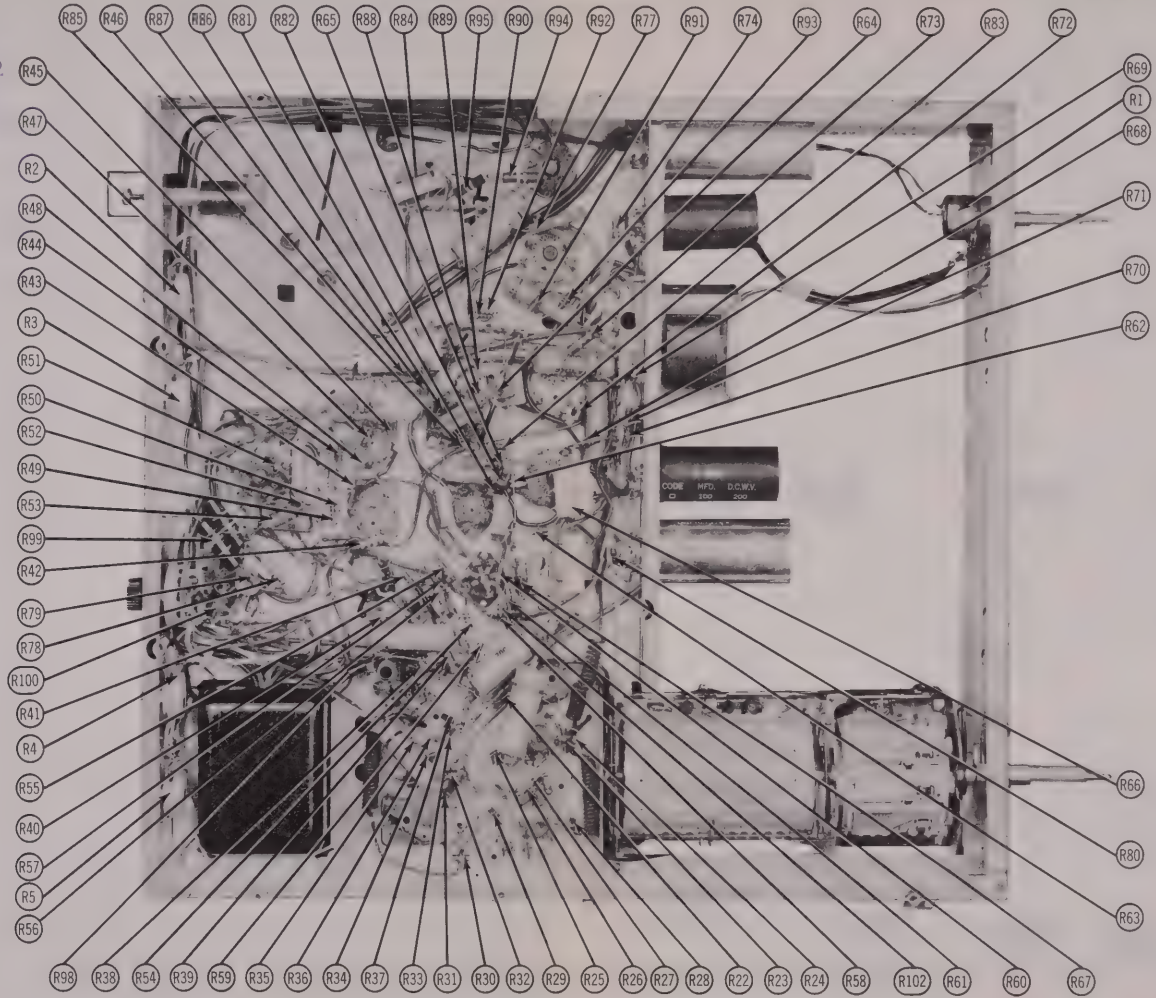

CHASSIS BOTTOM VIEW-RESISTOR IDENTIFICATION

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COLUMBIA-BELL & HOWELL
MODEL 350

Figure 1

COLUMBIA-BELL & HOWELL
MODEL 350

GENERAL INFORMATION

The Columbia-Bell & Howell Model 350 Tape Recorder features Stop, Forward, Rewind, Play, and Record modes of operation merely by pressing a button. A Speaker push-button is also provided for monitoring programs or for using the recorder as a P. A. System. This recorder is of the dual-track type, giving two full length recordings on a single reel of recording tape. Any size reel up to 7" can be used. Two neon recording indicators simplify the recording level setting. New recordings can be made on previously recorded tape since the erase head is automatically connected when the "Record" button is pressed or the same recording may be played back indefinitely. Recordings can be made from a radio, television receiver, or phonograph in addition to those made directly from the microphone. Recordings can be played back through the self-contained speaker or an external speaker may be connected through use of the Speaker Jack.

Model 350 is designed to operate on 60 cycle, 115 volts, AC supply only.

CAUTION: Severe Damage Will Result If Connection Is Made To A Direct Current (DC) Line.

Columbia Records Inc.
799 Seventh Avenue
New York 19, New York

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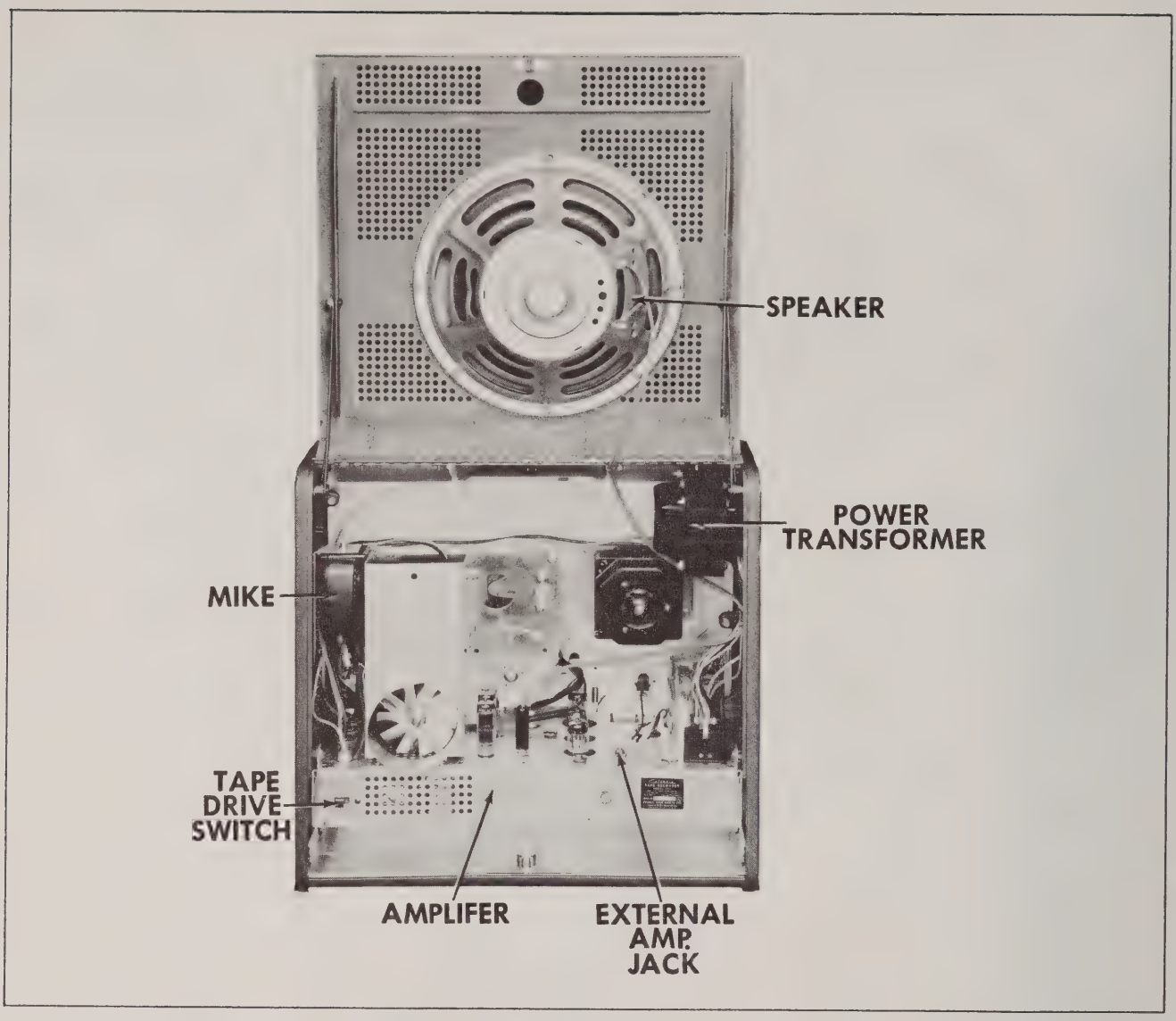

Figure 2

SPECIFICATIONS

Weight-
38 lbs. approximately.

Size-
16 1/2" h. x 17" w. x 9 1/2" d.

Reel Size-
Up to 7".

Tracks-
Dual.

Track Selection-
Manual turnover.

Tape Loading-
Drop-in-slot type.

Tape Speed-Play And Record-
7 1/2 and 3 3/4 ips.

Fast Forward-
7" reel in 90 seconds.

Fast Rewind-
7" reel in 90 seconds.

Recording Time (7" reel)-
1 hour at 7 1/2 ips. (1/2 hour each track)
2 hours at 3 3/4 ips. (1 hour each track)

Overall Frequency Response-
(Record To Playback At 7 1/2 ips.)
± 2db from 50 to 10,000 cps.

Distortion-
Less than 3% at 4 watts.

Power Output-
8 watts.

Wow And Flutter-
(At 7 1/2 ips.)
Less than 0.2%.

Audio Inputs-
Microphone, Radio, Phono, TV.

Audio Outputs-
(a) Internal or Extension Speaker.
(b) External Amplifier.

Controls-
3 knobs, 6 electric pushbuttons.

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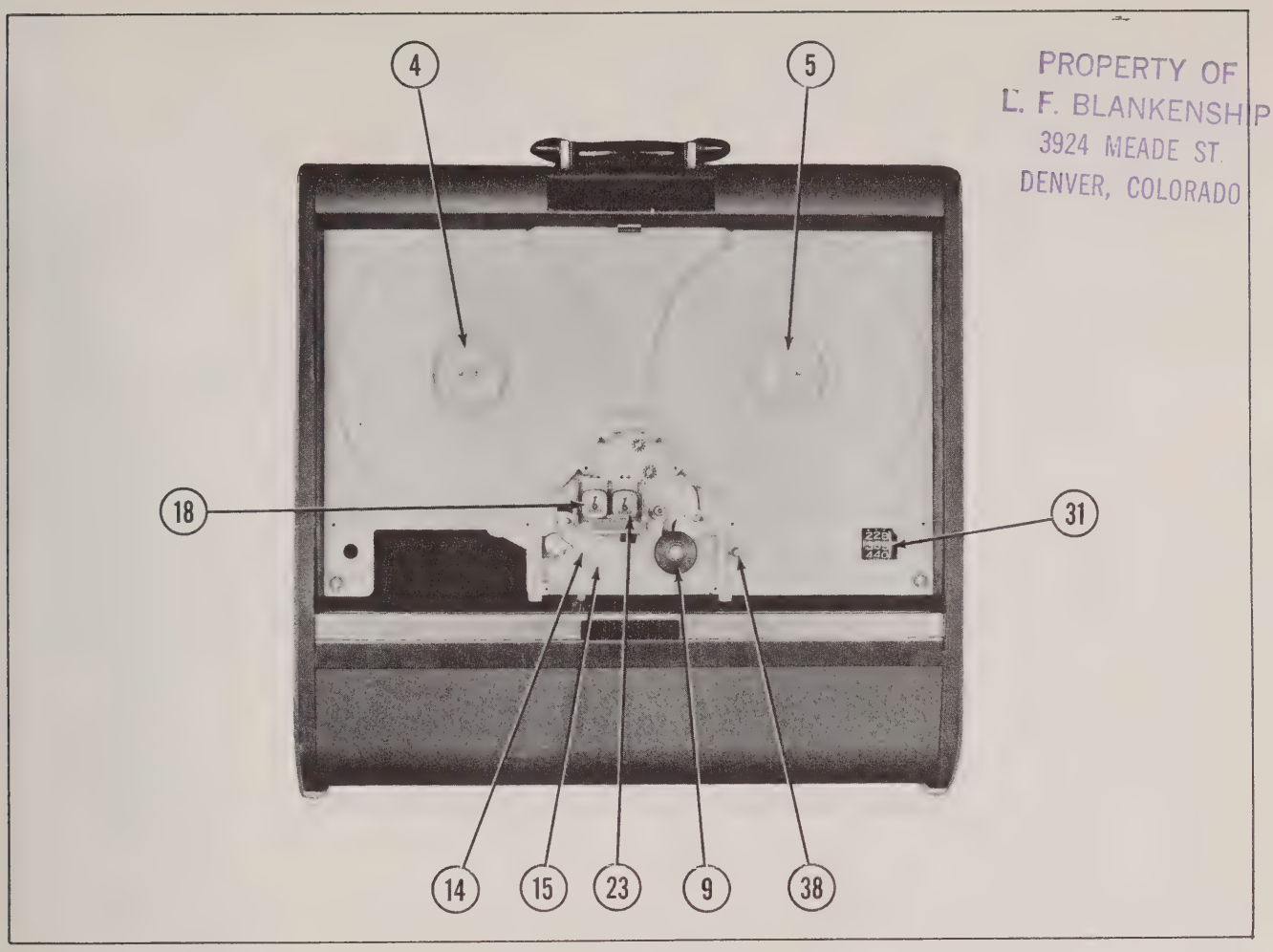

Figure 3

OPERATING INSTRUCTIONS

Making Connections-

Turn the "Tone" control to the left to "Off" and insert the power cord into the power receptacle on the right side of the cabinet. Plug the other end of the power cord into a convenient wall outlet of the proper rating.

Threading The Tape-

With the "Stop" button depressed, place an empty reel on the right hand (take-up) spindle. Place a full reel of tape on the left hand (supply) spindle so that the reel will turn counterclockwise when tape is pulled from the reel. Make certain that the reel springs on the spindles engage one of the slots in the hubs of the reels and that the reels are fully seated. Reel out about two feet of tape and feed the loose end up into the empty reel on the right spindle. Thread the tape into one of the slots in the outer surface of the hub. Hold the loose end between the fingers and slowly rotate this reel counterclockwise through a couple of revolutions. While taking up slack in the tape between the two reels the tape will automatically drop into the tape slot.

To Record From Microphone-

1. Insert the microphone plug into the "Mic. - Radio-Phono" input jack.

2. Turn the "Off-Tone-On" control to the right until a click is heard and allow approximately 30 seconds for the unit to warm up. "Power on" condition is indicated by indirect illumination of the lucite knobs from behind the front panel.

3. Unlock and push the "Record" button. Observe the "Record Level" indicator lamps while speaking into the microphone. Occasional flickering of the "Distortion" lamp indicates a good, high level of recording, however, continuous glowing or flashing in this lamp indicates that the "Volume" control setting must be reduced. Be sure that the "Normal" lamp glows fairly full and steady or you may not be recording properly, if at all.

NOTE: The "Tone" control is inoperative when recording.

Mic.-Radio-Phono Input-

This two-circuit, front-panel input jack provides a 220,000 ohm high-impedance input for the microphone and a low-impedance input for recording from a radio, phonograph or TV set. A two-conductor attachment cord is supplied in the storage compartment. This cord is terminated at one end with a jack plug and at the other with two alligator clips to enable you to make connection to various equipment for recording or monitoring.

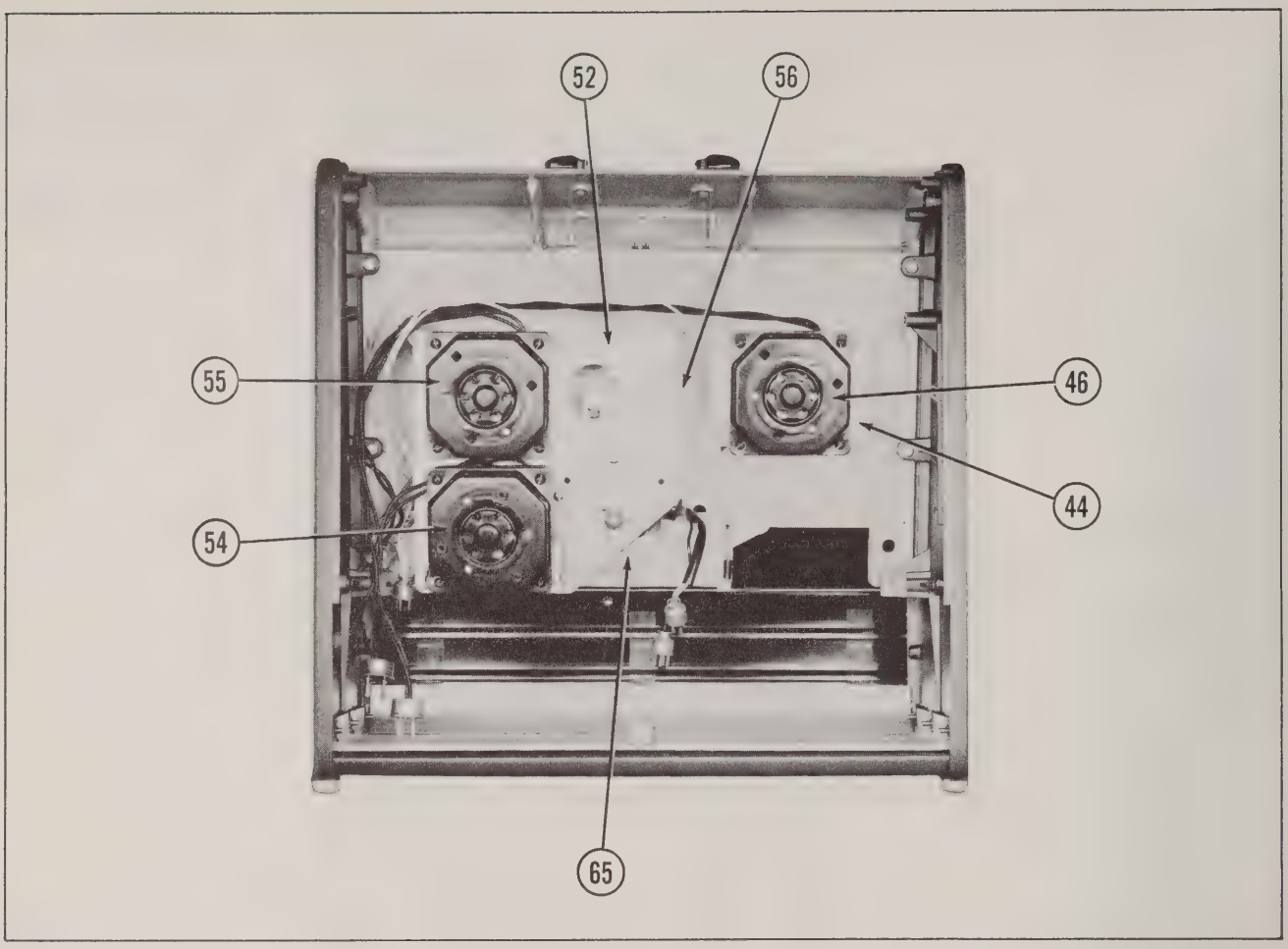

Figure 4

To Record From Radio, TV, Or Phonograph-

1. Take the radio-phono attachment cord from the storage compartment.

2. Turn off power to the recorder.

3. With the two alligator clips on the end of the radio-phono attachment cord, connect across the amplifier output or voice coil on the speaker of the radio, phono, or TV set.

4. Insert the plug of the radio-phono cord into the Mic.-Radio-Phono input jack on the front panel of the Stereotone.

5. Proceed with the recording as described in "To Record From Microphone".

Double-Track Recording-

The Columbia-Bell & Howell is designed so that only 1/2 the tape width is recorded at a time, thereby resulting in double-track recording. This double-track operation is accomplished in the following manner:

1. After a reel of tape has been recorded, i.e. all the tape wound on to the take-up reel, depress the "Stop" button. This stops all movement of the tape.

2. Remove the reels from the recorder, turning the full reel over and placing it on the left spindle and the empty reel on the right spindle.

3. Properly thread the tape and proceed with the recording.

4. After the second track has been recorded the first track is ready to be played, without rewinding, as follows:

(a) Place the full reel of tape on the left spindle and the empty reel on the right spindle.

(b) Thread the tape making sure the dull side faces the play-record head.

(c) Set the controls as described under "To Play A Recording".

To Play A Recording-

1. Thread the tape as described under "Threading The Tape".

2. Turn the "Off-Tone-On" control to the right and allow about 30 seconds for warm up.

3. Depress the "Play" button until it is latched into position.

4. Adjust the "Volume" and "Tone" controls for desired level.

To Edit And Splice Tape-

NOTE: Since it is impossible to edit and splice one track without affecting the other, recordings

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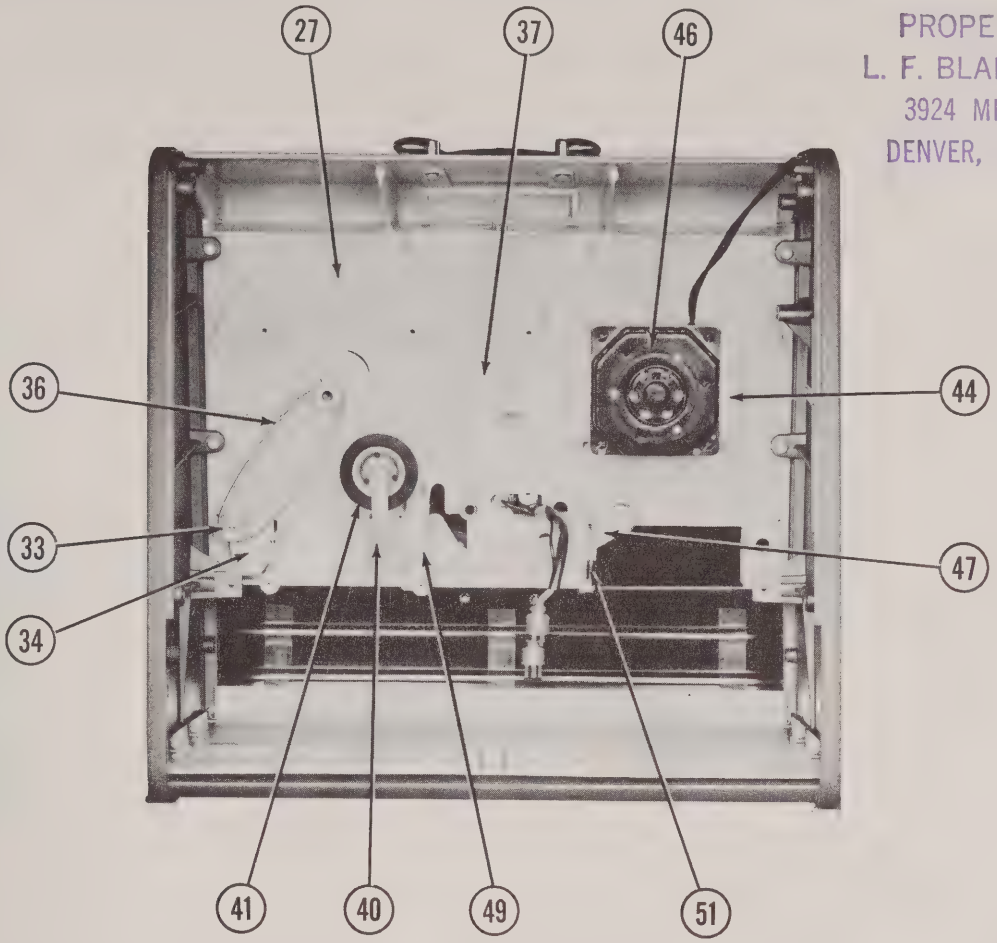

Figure 5

which are to be edited should be limited to one track only.

1. The tape may be edited by cutting out unwanted portions, or by joining selections into another sequence. Announcements may be inserted between selections, etc. Unused sections of tape can be spliced together for re-use.

(a) Cut tape at 60^0 angle with an overlap so ends will line up. (Cutting tape at 60^0 angle will eliminate detection of splice on recording.)

(b) Align both ends of tape, with glossy side up.

(c) Cover aligned ends with splicing tape, evenly and securely.

(d) Trim off excess splicing tape. (Cut into the recording tape very slightly.) This eliminates possibility of a sticky splice.

To Use External Speaker-

Any size speaker of the permanent magnet type, having a 3.2 ohm voice coil, may be used by connecting the alligator clips of the radio-phono cord across the voice coil of the external speaker and then inserting the radio-phono cord plug (same type as speaker plug) into the "Speaker" jack.

Fast Forward And Fast Rewind-

High-speed forward or rewind can be obtained by pressing the desired button. These functions are used primarily in locating a desired portion of a recording in a few seconds. You may press the "Forward" or "Rewind" button while in "Play" or "Record" positions but you cannot switch to other functions until you have first pressed the "Stop" button.

IMPORTANT: When pressing the "Stop" button... hold it down until the reels come to a complete stop.

To Use Recorder As A Public Address System-

To operate this recorder as a public address unit, insert the microphone plug into the "Mic.-Radio-Phono" input and turn the power on. At the back of the amplifier move the "Tape Drive" switch (Figure 2) to "Off". Unlock and press the "Record" and "Speaker" buttons. While speaking into the microphone adjust the "Volume" and "Tone" controls to the desired level.

The public address program may be recorded by leaving the "Tape Drive" switch in the "On" position. Then, proceed with the program as described above.

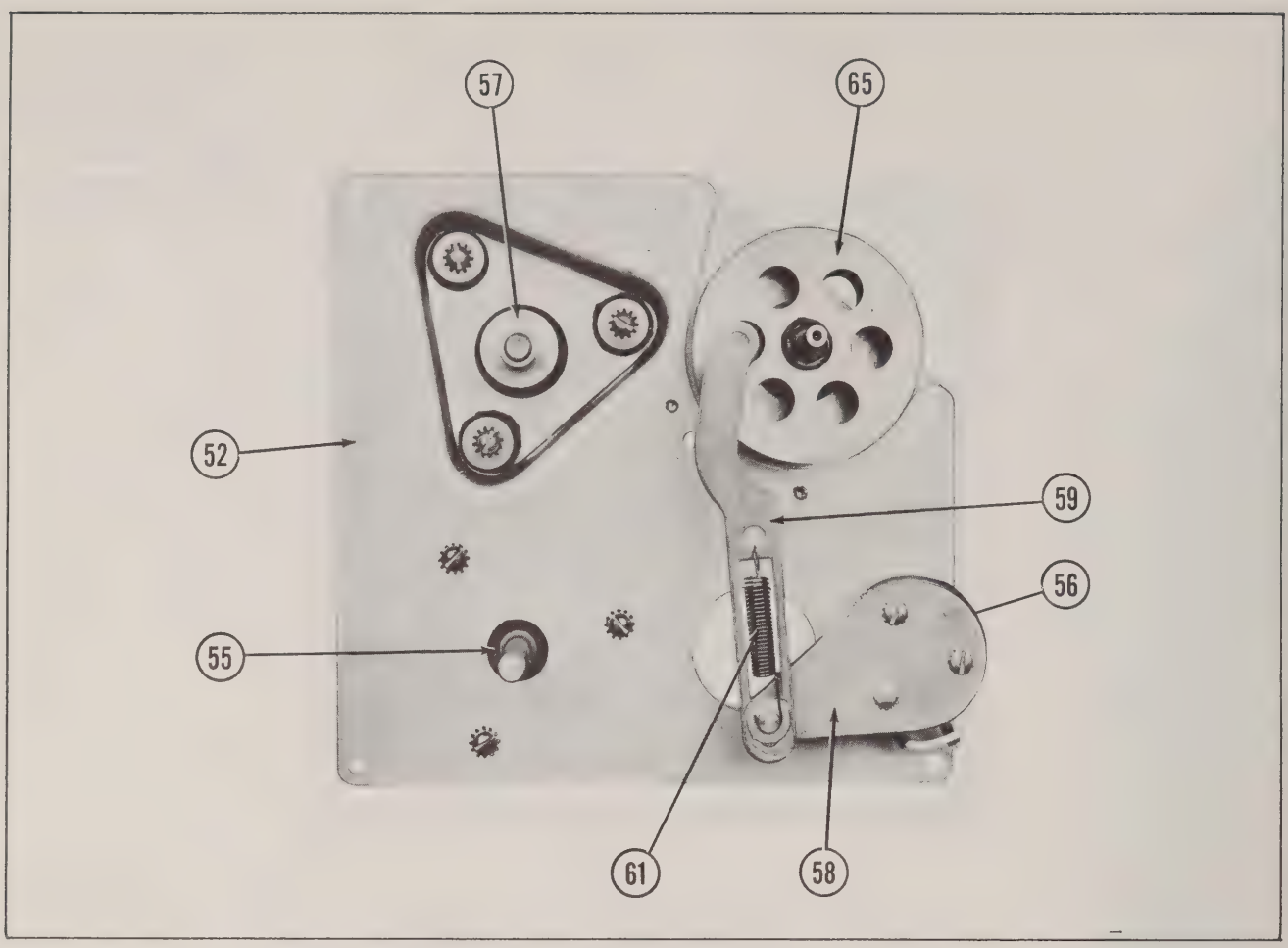

Figure 6

Program Indicator-

This odometer- type indicator registers "000" to "999" and will save much guesswork when trying to locate a desired portion of a pre-recorded tape. The reading of the indicator may be noted as the recording is being made so that reference to any given point on the tape may be made very rapidly. When a recorded tape has been so logged or referenced, always "zero" the indicator before starting to play the recording. This should be done before tape is threaded on the take-up reel. Press the "Forward" button and observe the indicator. Use the "Stop" button when approaching "000" and then the last few digits can be turned off manually by spinning the take-up reel with the fingers.

Speed Change-

This recorder operates at two speeds - 7 1/2 or 3 3/4 inches-per-second. The "Speed Change" knob will enable you to play or record tape at either speed. For 3 3/4" operation, take hold of the knob and turn it gently to the left, pull out, and release. To restore the setting to 7 1/2", take hold of the knob as before, turn it gently to the left, push in, and release.

ADJUSTMENTS

Play/Record Head Adjustment-

It is very important that play-record head (23) be lined up perfectly with the tape. If it is not, low output, loss of high frequencies or track overlap may result.

IMPORTANT: The heads have been aligned and locked in place at time of manufacture and should require no further adjustment, unless it becomes necessary to install a new head.

To adjust, make a tape recording of a 3000 cycle signal on a good unit. Place this on the unit that the head is to be aligned on. Connect an output meter or AC voltmeter across the speaker voice coil. Play the 3000 cycle tape, rock play-record head (23) back and forth, loosening two screws (20) will allow you to do this, and notice a variation in the output voltage at the voice coil. Tighten screws (23) in the position of highest output.

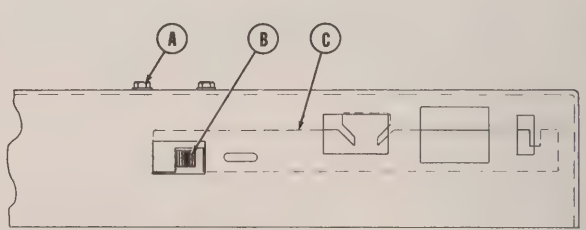

Figure 7

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Memory Switch Adjustment-
(To Correct Imbalance In Braking)-

Remove amplifier chassis from case. Just above toggle on front of amplifier are two nuts (A) (See Fig. 7). Loosen these two nuts. Press the "Rewind" button to the bottom. Pull toggle of (B) to extreme right on switch assembly. Position entire switch assembly with left side of toggle just touching the latch bar (C) as shown in Fig. 7, then tighten the two nuts (A).

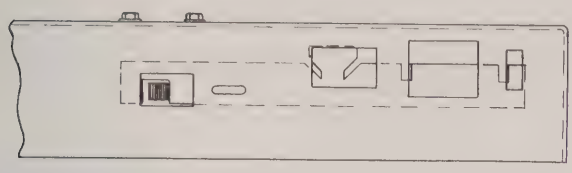

Figure 8

To check the adjustment, press the "Forward" button and observe new position of the toggle. It should then be in the extreme left position with the latch bar just touching the right side of the toggle as shown in Fig. 8.

LUBRICATION

This recorder has been lubricated at time of manufacture and this should be sufficient for the life of the recorder. In cases of extreme use or if parts are replaced, spread a thin film of Lubriplate on the pivot points of levers. Parts such as pressure roller (9), idler wheel (41), and flywheel assembly (65) are provided with generous-size oilite bearings and require no further attention.

CAUTION: Do not oil the motor bearings unless absolutely necessary as excess oil will only be thrown off and get on the pulleys and rollers. Always use as little oil as possible. If any oil should get on the pulleys or rollers wipe off with a petroleum solvent, such as alcohol.

CLEANING

The erase head, play/record head, capstan, and pressure roller are subject to an accumulation of tape coating oxide which is worn off the tape as it passes these parts. If left unattended the playing and recording qualities of the recorder will be affected. Periodically clean these surfaces with a soft cloth and alcohol.

TROUBLE CHART

SYMPTOM	CAUSE	REMEDY
Broken reel spring (6).	Defective spring (6).	Replace spring. Turn spindle (4 or 5) until spring is on top of spindle. Put speaker panel in upright position. With long end of #8 allen wrench reach over spindle motor, locate and engage head of allen set screw (7) in top of hub between motor and front panel. Give allen wrench one-half turn to left to loosen screw and pull out broken spring from front of panel. Insert new spring and tighten set screw. NOTE: When placing new spring in position - push all the way in, then back out about 1/32" before tightening allen set screw.
Tape reel rubs on front panel.	Spindle hub (4 or 5) out of alignment.	(a) Remove reel spring (6), as above. (b) Turn spindle until reel spring slot is under spindle. With #8 allen wrench reach over spindle motor, locate and engage head of allen set screw in hub between motor and front panel. Give allen wrench one-half turn to left to loosen screw. (c) Slide hub slightly outward on spindle away from front panel and tighten set screw. Put empty reel on spindle and check for clearance between reel and panel and also for alignment of reel hub with tape feed from capstan. (d) Install reel spring (see "Replace Spring" above).
Take-up or Rewind sluggish or inoperable.	IMPORTANT: Tape is an elastic medium of recording. Stretching this tape will introduce "wow" and "flutter" (distortion) far in excess of the design specifications to which the Stereotone is manufactured. Fast tape transport in both directions is a highly desirable feature but must not be achieved at the sacrifice of fidelity of the recorded tape. For this reason the "take-off" must be a gentle action with positive control of the transport function - particularly at the ends of the tape. NOTE: A full 7" reel of 1200 feet of tape can be transported in either direction in about 40 seconds.	

SYMPTOM	CAUSE	REMEDY
		Due to the gentle take-off action a slight manual assistance may be necessary to start the reels. By this means positive control is maintained and the tape may be repositioned at any point with great accuracy and with no loss of overall fidelity.
Takeup or Rewind sluggish (continued).	1. Low supply voltage.	1. Check line voltage. Should be between 105 and 125 volts AC.
	2. Drive belt (36) between take-up motor and PROGRAM INDICATOR odometer pulleys is too tight.	2. Stretch drive belt (36) slightly.
	3. Defective odometer.	3. Remove drive belt (36) from odometer pulley (33) and turn pulley with fingers through several revolutions. If pulley does not turn freely at any point of revolution replace odometer.
	4. Spindle motor bearing out of alignment due to rough handling during shipment.	4. Tap end of spindle sharply with wooden or plastic handle of screwdriver.
Tape Speed erratic.	1. Capstan drive slipping due to oil or dirt on drive surfaces.	1. Clean drive surface using a small lintless, soft cloth (cheesecloth or equivalent) dipped lightly in carbon tetrachloride, alcohol, or lighter fluid. With drive running, hold cloth against motor drive wheel (57), idler wheel (41), and capstan flywheel (65).
	2. Tape wound around capstan; oil or dirt on pressure roller.	2. Remove two screws in front of recording-head cover plate (1). If tape is wound around capstan peel or cut it off. CAUTION: Be extremely careful not to scratch or mar surface of capstan. Use soft cloth dipped in carbon tetrachloride, alcohol, or lighter fluid to clean surface of capstan and pressure roller. Use pipe-stem cleaner dipped lightly in one of above fluids to wipe off any tape dust from face of Brush "redheads". Replace cover plate and screws. NOTE: Do not turn screws in too tightly.
Rubber foot under recorder broken or missing.	Defective or damaged foot.	Replace by removing mounting screw and replacing foot.
Loose tension spring on speaker panel.	1. Spring disengaged from panel bracket.	1. Engage spring properly.
	2. Spring fatigued.	2. Replace with new spring. If on left side, remove bracket retaining screw, take off end of bracket, slide off spring and replace it. Put end of bracket in position and screw in place. If on right side, turn power off, loosen the two mounting screws securing the power transformer to the right side of the recorder case sufficiently to enable removing screw, end of bracket, and spring. Proceed as above to replace. Tighten transformer mounting screws securely.
Hum in playback.	1. Congested wiring.	1. Separate wires in back of recorder to make certain none comes against moving parts. Check that all plug-in connections are securely in place. Reverse the power-cord plug in wall socket.
	2. Recorded signal level too low.	2. Press "PLAY" button and set "VOLUME" for preferred listening level. Place "SPEED CHANGE" knob

SYMPTOM	CAUSE	REMEDY
		in "NEUTRAL" (between the 3 3/4 and 7 1/2 ips). Hum should disappear indicating too low an input signal level was used for recording. Set proper input level when recording. NOTE: It should never be necessary to raise the "VOLUME" control setting above "3" or "4" when recording. If hum persists observe the following:
	3. AC hum pickup from power equipment (transformers), fluorescent fixtures, etc.	3. Avoid operating the recorder in the proximity of such devices and/or provide a good electrical ground for the amplifier chassis.
	4. Hum pickup from associated signal equipment.	4. (a) Switch input connections. (b) Provide a common metallic bond between all associated equipment and ground system securely. (c) If signal output voltage of associated equipment is characteristically low use shielded lead between signal source and Stereotone input.
	5. Defective vacuum tube.	5. Check and replace faulty tube.
Does not erase properly.	Pressure pad worn.	Remove recording-head cover plate (1) and examine felt pads on pressure levers. Replace if worn. Peel off old pads and mount new ones (from envelope stapled in Instruction book) using DuPont clear cement or equivalent.
Does not record properly.	1. Faulty operating procedure.	1. Refer to "Operating Instructions". Also observe "REMEDY" column under "Hum In Playback" of this chart.
	2. Pressure pad worn.	2. Examine for worn pads and replace if necessary (see replacement directions above).
	3. Distorted recording.	3. Try recording with microphone supplied with the Stereotone. If clean recording can be made with "mike" check for mismatched impedance in hookup of associated equipment.

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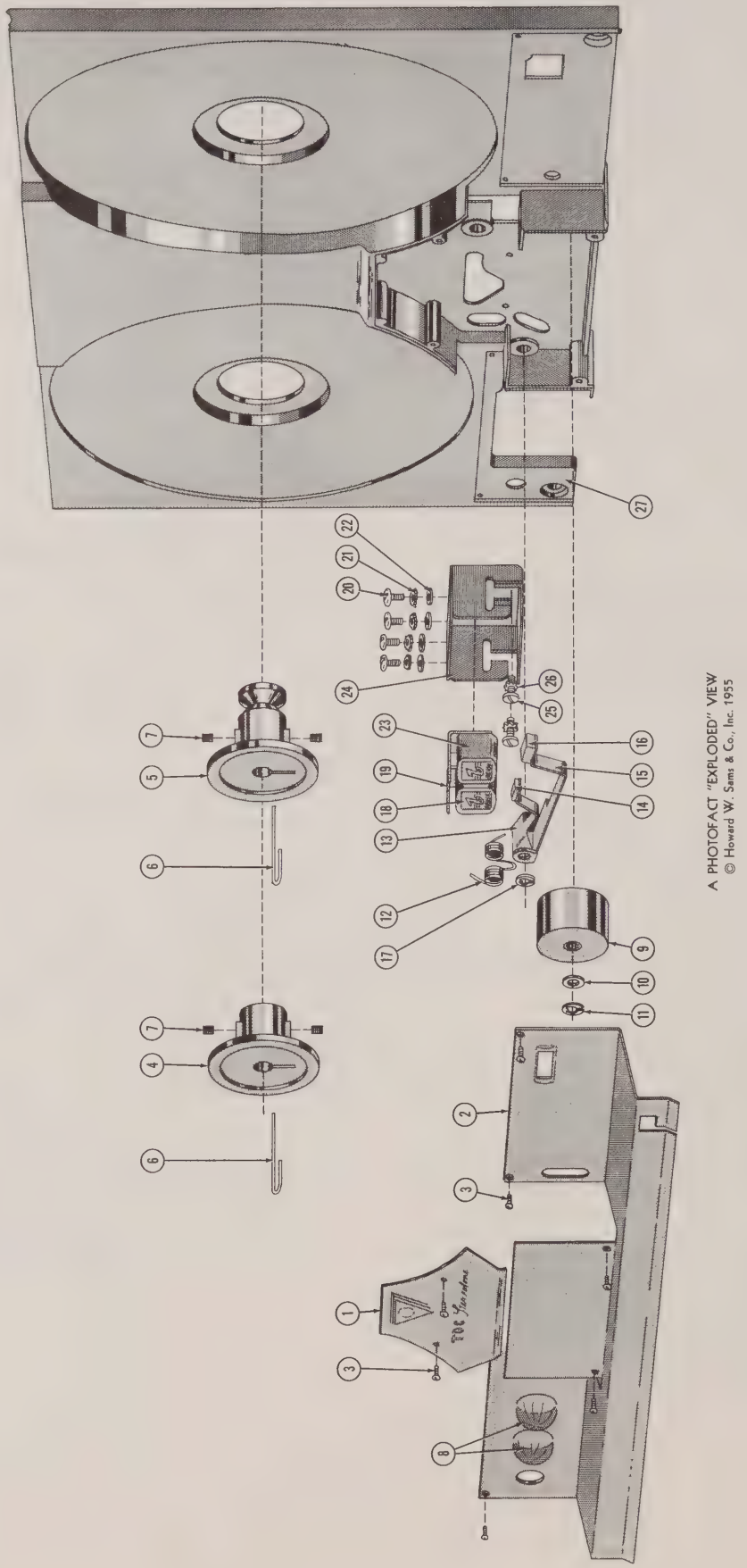

Figure 9A. Exploded View Of Parts In Front Of Baseplate.

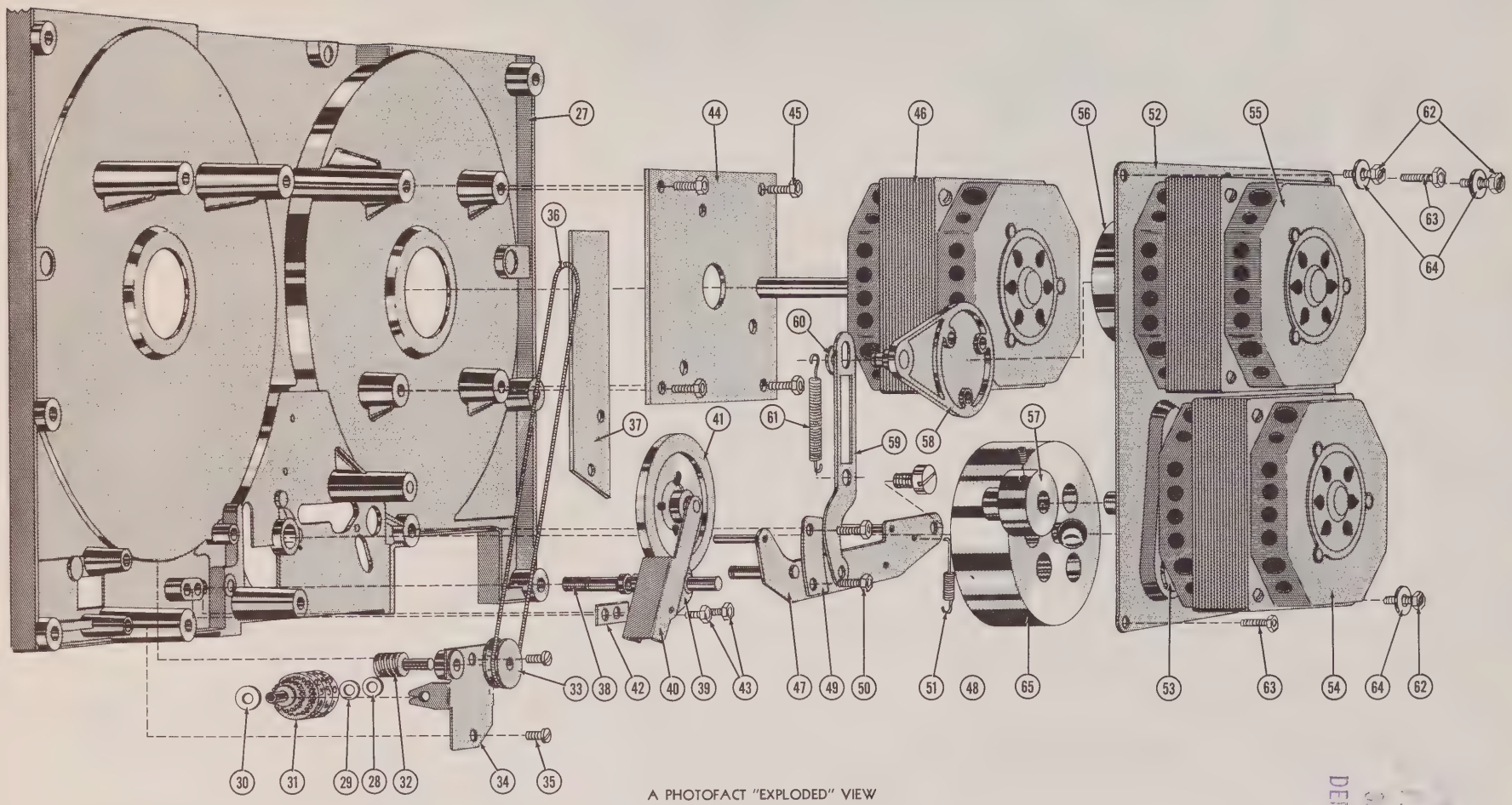

Figure 9B. Exploded View Of Parts At Rear Of Baseplate.

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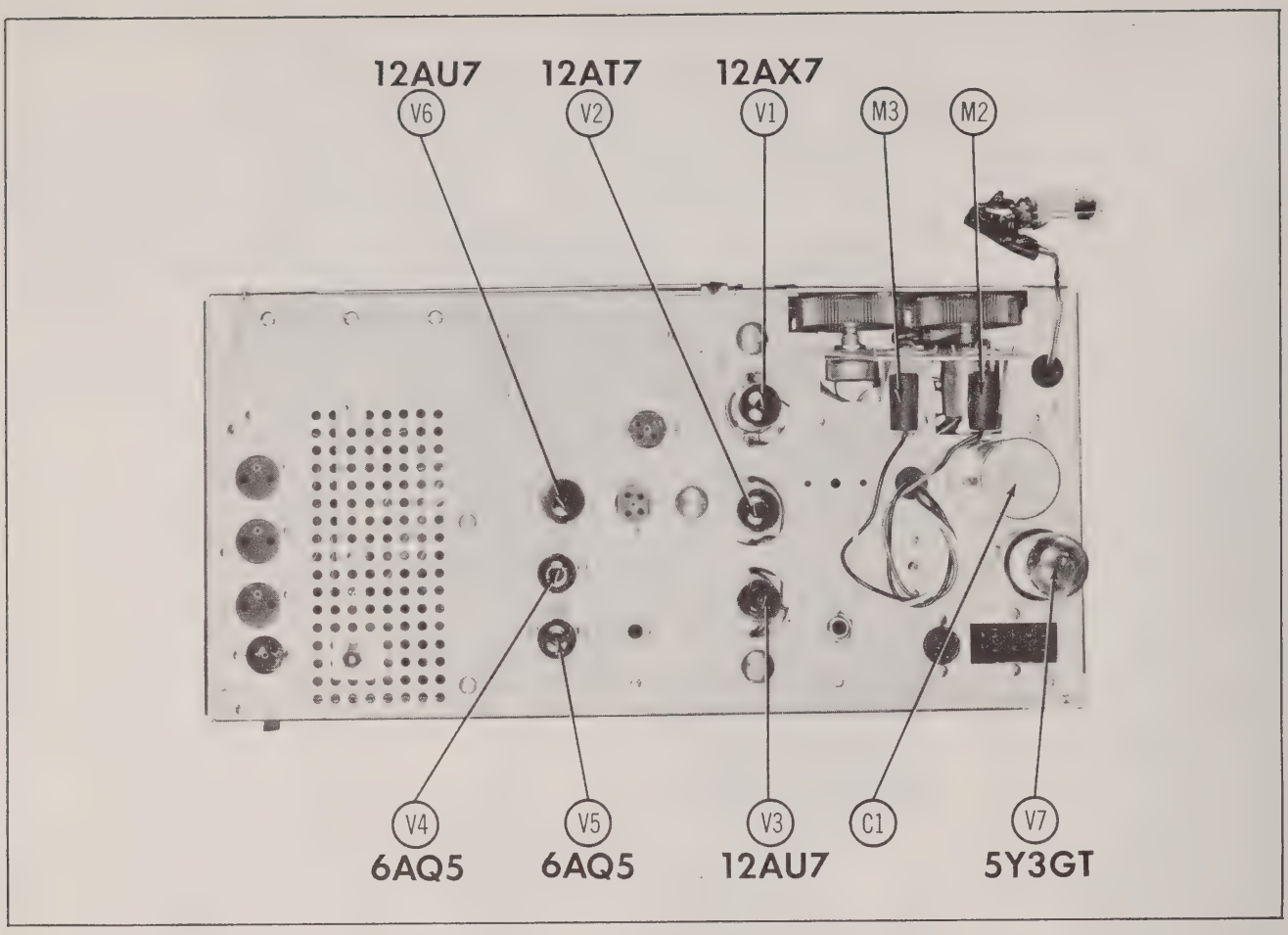
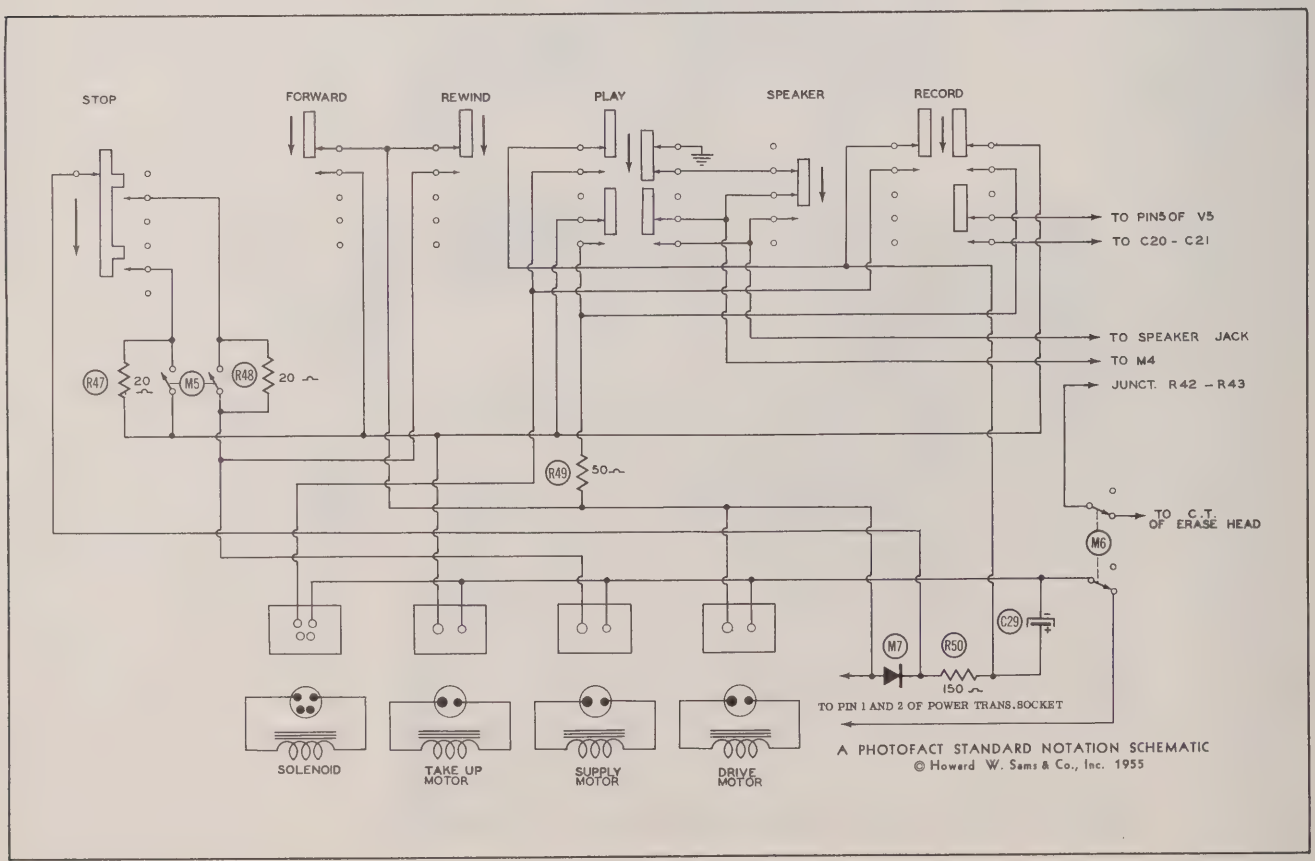
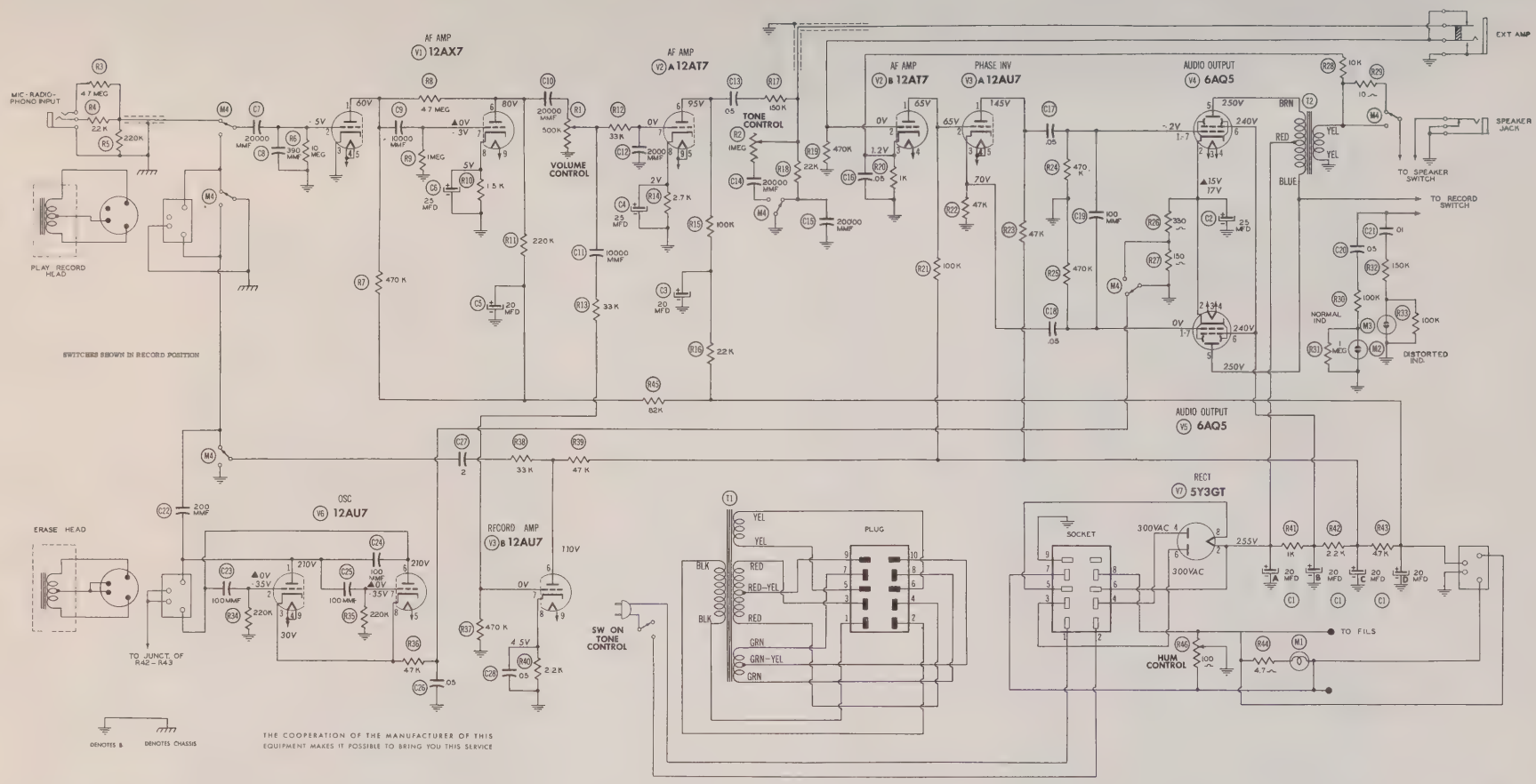


Figure 10



AC WIRING DIAGRAM



RESISTANCE READINGS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8	Pin 9
V 1	12AX7	†600KΩ	1046Ω	0Ω	20Ω	20Ω	†300KΩ	1Meg	1.8KΩ	20Ω
V 2	12AT7	†100KΩ	▲470KΩ 40KΩ	1KΩ	20Ω	20Ω	†120KΩ	100KΩ	2.7KΩ	20Ω
V 3	12AU7	†50KΩ	†100KΩ ▲330Ω	47KΩ	20Ω	20Ω	†50KΩ	470KΩ	2.2KΩ	20Ω
V 4	6AQ5	470KΩ	480Ω	30Ω	20Ω	†200Ω	†1KΩ	470KΩ		
V 5	6AQ5	470KΩ	▲330Ω 480Ω	30Ω	20Ω	†200Ω	†1KΩ	470KΩ		
V 6	12AU7	13.5KΩ	220KΩ	▲INF 4.7KΩ	20Ω	20Ω	13.5KΩ	220KΩ	▲INF 4.7KΩ	20Ω
V 7	5Y3GT	INF	180KΩ	INF	420Ω	INF	400Ω	INF	180KΩ	

▲ MEASURED IN 'PLAY' POSITION
† MEASURED FROM PIN 2 OF V1
ALL MEASUREMENTS TAKEN IN 'RECORD' POSITION UNLESS OTHERWISE DESIGNATED.

A PHOTOFACT STANDARD NOTATION SCHEMATIC
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272-3

COLUMBIA-BELL & HOWELL
MODEL 350

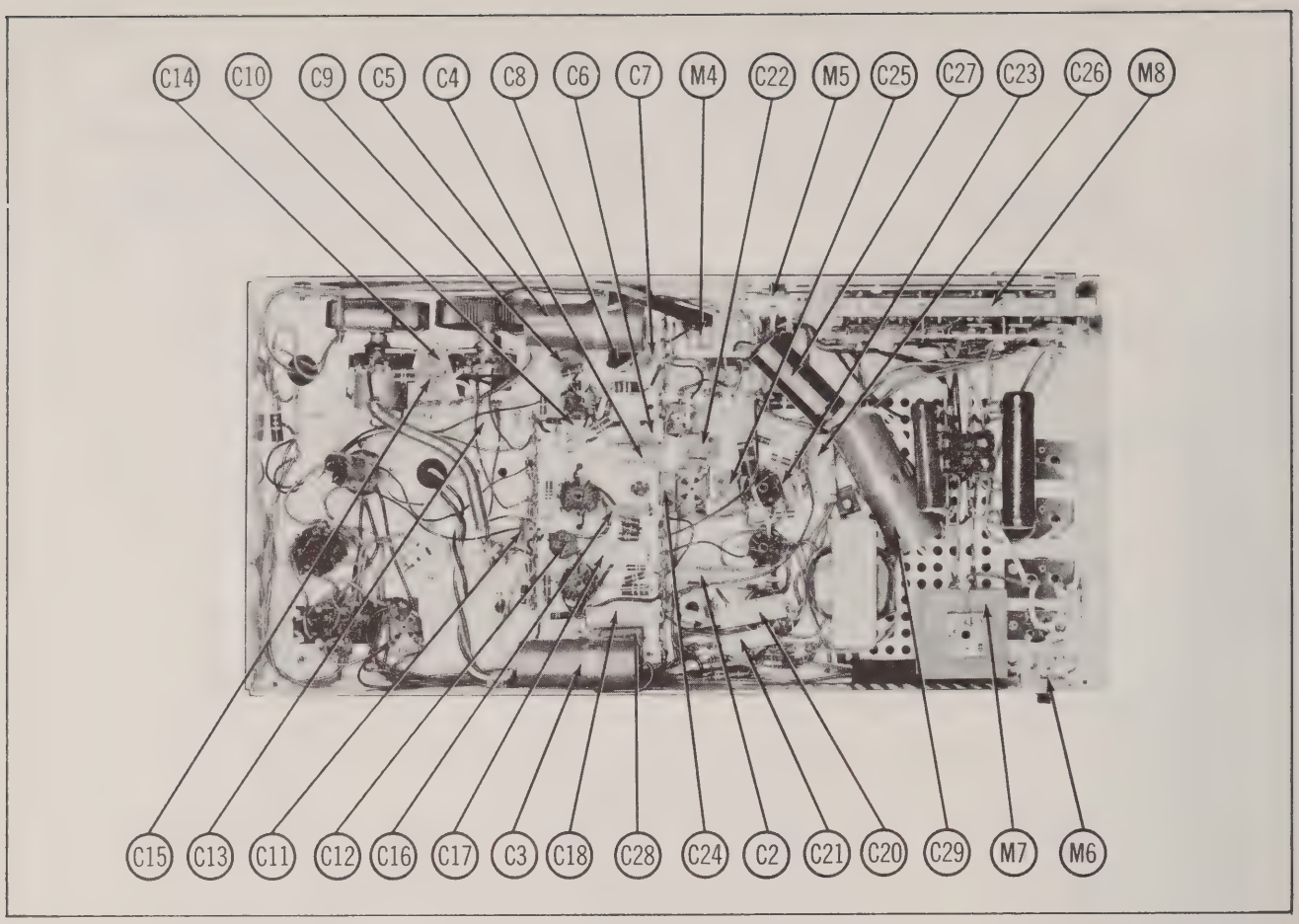

Figure 11

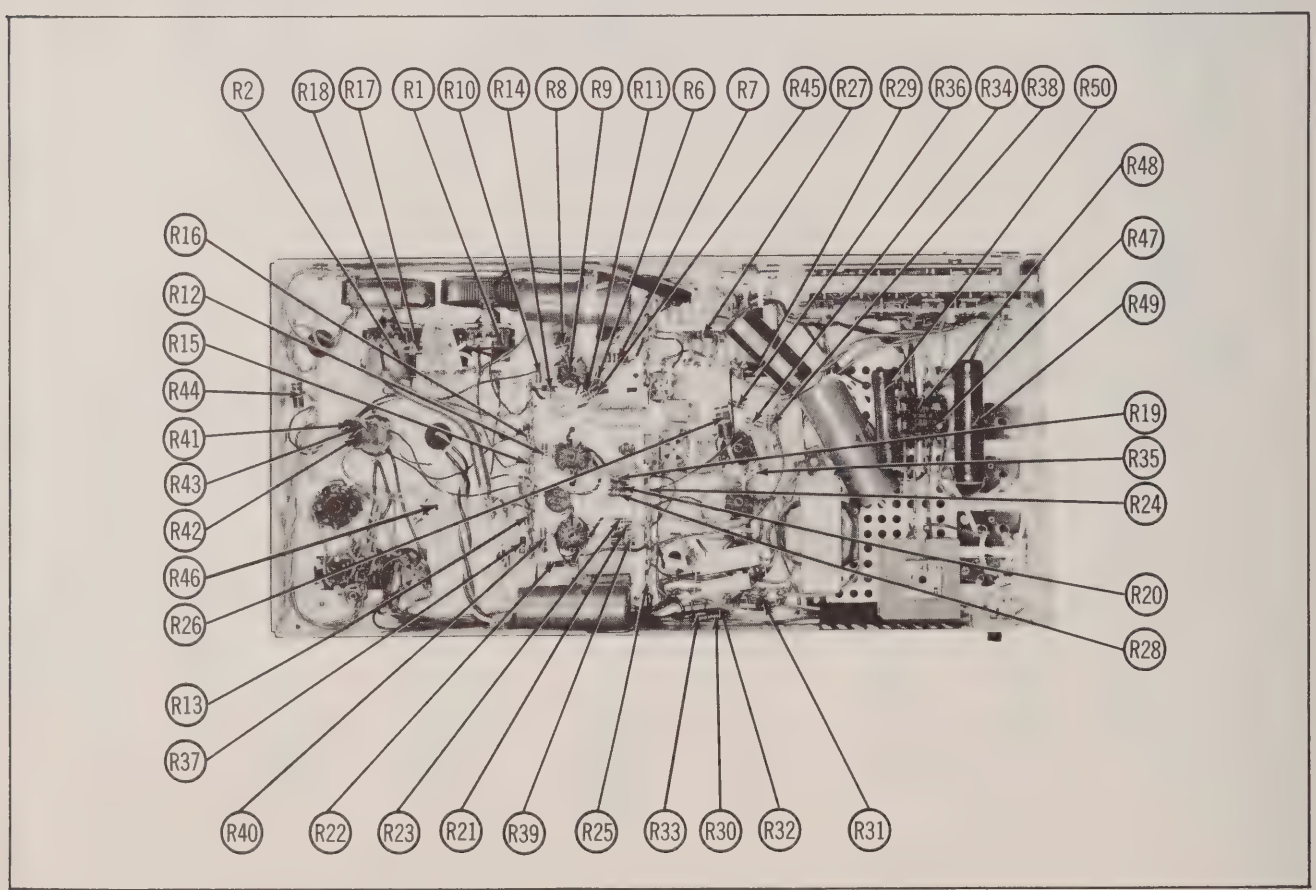

Figure 12

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ELECTRICAL PARTS LIST

Ref. No.	Part No.	Description	Ref. No.	Part No.	Description
V1	93-1	12AX7, Pre-Amp.	R12	99-22	Resistor, 33KΩ, 1/2 W., 10%
V2	93-2	12AT7, AF Amp.	R13	99-22	Resistor, 33KΩ, 1/2 W., 10%
V3	93-3	12AU7, Phase Inv. & Record Amp.	R14	99-9	Resistor, 2.7KΩ, 1/2 W., 10%
V4	93-4	6AQ5, Audio Output	R15	99-8	Resistor, 100KΩ, 1/2 W., 10%
V5	93-4	6AQ5, Audio Output	R16	99-2	Resistor, 22KΩ, 1/2 W., 10%
V6	93-3	12AU7, Oscillator	R17	99-16	Resistor, 150KΩ, 1/2 W., 10%
V7	93-5	5Y3GT, Rectifier	R18	99-2	Resistor, 22KΩ, 1/2 W., 10%
C1A	98-10	Elect. Cap., 20mfd. @450V.	R19	99-17	Resistor, 470KΩ, 1/2 W., 10%
C1B		Elect. Cap., 20mfd. @450V.	R20	99-44	Resistor, 1KΩ, 1/2 W., 10%
C1C		Elect. Cap., 20mfd. @450V.	R21	99-8	Resistor, 100KΩ, 1/2 W., 10%
C1D		Elect. Cap., 20mfd. @450V.	R22	99-20	Resistor, 47KΩ, 1/2 W., 10%
C2	98-21	Elect. Cap., 25mfd. @50V.	R23	99-20	Resistor, 47KΩ, 1/2 W., 10%
C3	98-19	Elect. Cap., 20mfd. @350V.	R24	99-17	Resistor, 470KΩ, 1/2 W., 10%
C4	98-18	Elect. Cap., 25mfd. @6V.	R25	99-17	Resistor, 470KΩ, 1/2 W., 10%
C5	98-26	Elect. Cap., 20mfd. @350V.	R26	99-40	Resistor, 330Ω, 2 W., 10%
C6	98-18	Elect. Cap., 25mfd. @6V.	R27	99-19	Resistor, 150Ω, 1 W., 10%
C7	98-7	Ceramic Cap., 20,000mmf., 10%	R28	99-14	Resistor, 10KΩ, 1/2 W., 10%
C8	98-17	Ceramic Cap., 390mmf., 10%	R29	99-21	Resistor, 10Ω, 2 W., 10%
C9	98-15	Ceramic Cap., 10,000mmf., 10%	R30	99-8	Resistor, 100KΩ, 1/2 W., 10%
C10	98-7	Ceramic Cap., 20,000mmf., 10%	R31	99-10	Resistor, 1Meg, 1/2 W., 10%
C11	98-15	Ceramic Cap., 10,000mmf., 10%	R32	99-16	Resistor, 150KΩ, 1/2 W., 10%
C12	98-6	Ceramic Cap., 2000mmf., 10%	R33	99-8	Resistor, 100KΩ, 1/2 W., 10%
C13	98-8	Molded Paper, .05mfd. @400V., 10%	R34	99-1	Resistor, 220KΩ, 1/2 W., 10%
C14	98-7	Ceramic Cap., 20,000mmf., 10%	R35	99-1	Resistor, 220KΩ, 1/2 W., 10%
C15	98-7	Ceramic Cap., 20,000mmf., 10%	R36	99-41	Resistor, 4.7KΩ, 1/2 W., 10%
C16	98-20	Paper Cap., .05mfd. @150V.	R37	99-17	Resistor, 470KΩ, 1/2 W., 10%
C17	98-8	Molded Paper, .05mfd. @400V., 10%	R38	99-22	Resistor, 33KΩ, 1/2 W., 10%
C18	98-8	Molded Paper, .05mfd. @400V., 10%	R39	99-55	Resistor, 47KΩ, 1/2 W., 10%
C19	98-12	Ceramic Cap., 100mmf., 10%	R40	99-56	Resistor, 2.2KΩ, 1/2 W., 10%
C20	98-8	Molded Paper, .05mfd. @400V., 10%	R41	99-43	Resistor, 1KΩ, 2 W., 10%
C21	99-22	Molded Paper, .01mfd. @400V., 10%	R42	99-42	Resistor, 2.2KΩ, 2 W., 10%
C22	98-24	Mica Cap., 200mmf., 10%	R43	99-33	Resistor, 4.7KΩ, 1 W., 10%
C23	98-12	Mica Cap., 100mmf., 10%	R44	99-29	Resistor, 4.7Ω, 1 W., 10%
C24	98-12	Mica Cap., 100mmf., 10%	R45	99-11	Resistor, 82KΩ, 1/2 W., 10%
C25	98-12	Mica Cap., 100mmf., 10%	R46	99-15	Hum Balance Cont. 100Ω
C26	98-8	Molded Paper, .05mfd. @400V., 10%	R47	99-37	Resistor, 20Ω, 5 W., W.W.
C27	98-23	Paper Tub., .2mfd. @600V.	R48	99-37	Resistor, 20Ω, 5 W., W.W.
C28	98-20	Paper Cap., .05mfd. @150V.	R49	99-57	Resistor, 50Ω, 30 W., W.W.
C29	98-14	Elect. Cap., 40mfd. @350V.	R50	99-5	Resistor, 150Ω, 20 W., W.W.
R1	99-35	Volume Cont., 500KΩ	T1	130-3	Power Transformer
R2	99-36	Tone Cont. & Switch, 1 Meg.	T2	130-4	Output Transformer
R3	99-3	Resistor, 4.7Meg., 1/2 W., 10%	M1	87-62	Pilot Lamp, Type TS47
R4	99-2	Resistor, 22KΩ, 1/2 W., 10%	M2	87-61	Neon Lamp, Type NE51, Normal Ind.
R5	99-1	Resistor, 220KΩ, 1/2 W., 10%	M3	87-61	Neon Lamp, Type NE51, Distorted Ind.
R6	99-6	Resistor, 10Meg., 1/2 W., 10%	M4	86-18	Play-Record Slide Switch
R7	99-7	Resistor, 470KΩ, 1 W., 10%	M5	86-19	Memory Switch
R8	99-3	Resistor, 4.7Meg., 1/2 W., 10%	M6	86-20	Tape Drive Switch
R9	99-10	Resistor, 1Meg., 1/2 W., 10%	M7	130-6	Selenium Rectifier
R10	99-39	Resistor, 1.5KΩ, 1/2 W., 10%	M8	86-21	Push Button Switch
R11	99-1	Resistor, 220KΩ, 1/2 W., 10%			

MECHANICAL PARTS LIST

Ref. No.	Part No.	Description	Ref. No.	Part No.	Description
1	130-346	Nameplate -Record Head Cover	11	82-7	E - Ring
2	130-344	Nameplate - Main	12	130-209	Spring - Double Torsion
3	11-13	Screw, Rd. Hd. Thd. Cut. #2-56 x 3/16	13	130-246	Erase Arm
4	130-229	Disc-Rewind Spindle	14	130-330	Erase Head Pad
5	130-243	Disc-Take Up Spindle	15	130-247	Record And Play Arm
6	130-271	Spring - Reel	16	130-273	Record Head Pad
7	41-2	Screw - Set #8-32 x 1/4	17	82-7	E - Ring
8	130-308	Cap Plastic Neon	18	130-2	Erase Head
9	130-264	Roller - Pressure	19	130-282	Head Bracket
10	130-207	Washer - Pressure Roller	20	3-2	Screw - Bd. Hd. #5-40 x 3/16

MECHANICAL PARTS LIST - Con't.

Ref. No.	Part No.	Description
21	63-1	Washer - #5 Ext. Tooth
22	61-34	Washer - 9/64 x 1/4 x .031
23	130-1	Record - Play Head
24	130-202	Tape Guide
25	63-4	Washer - #6 Ext. Tooth
26	3-4	Screw - Bd. Hd. #6-32 x 1/4
27	130-M-235	Mech Housing
28	67-9	Spring Washer
29	61-26	Washer - .196 x 5/16 x 1/32
30	61-70	Washer - .224 x 7/16 x .030
31	130-S-11	Counter Assembly
32	130-S-10	Counter Worm Assembly
33	130-252	Counter Pulley
34	130-S-43	Counter Frame & Bearing Assy.
35	13-1	Screw - Bd. Hd. 6-32 x 1/4
36	130-355	Counter Belt
37	130-323	Hum Shield
38	130-212	Speed Changer Shaft
39	130-278	Idler Crank
40	130-211	Idler Link
41	130-263	Idler Wheel
42	130-206	Speed Changer Shaft Stop
43	18-22	Screw - Hex Hd. Self T. #6-32 x 5/16
44	130-285	Rewind Motor Mounting Plate
45	18-23	Screw - Hex Hd. Self T. #8-32 x 5/16
46	90-38	Rewind Motor
47	130-201	Pressure Roller Plate
48	130-205	Pivot Roller Arm Screw
49	130-296	Roller Plate Guide
50	18-22	Screw - Hex Hd. Self T. #6-32 x 5/16
51	130-314	Roller Plate Spring
52	130-210	Motor Mtg. Drive Plate
53	89-10	Shock Mount (Lord)
54	90-27	Drive Motor
55	90-29	Take Up Motor
56	130-S-35	Solenoid & Plug Assembly
57	130-231	Drive Motor Pulley
58	130-S-46	Solenoid Arm & Pin Assembly
59	130-240	Solenoid Link
60	61-9	Washer - Plain .265 x 1/2 x .030
61	130-266	Solenoid Link Spring
62	18-25	Screw - Hex Hd. #8-32 x 1/2
63	18-23	Screw - Hex Hd. Self T. #8-32 x 5/16
64	61-39	Washer - Plain 3/16 x 7/16 x 1/32
65	130-S-14	Flywheel Assembly

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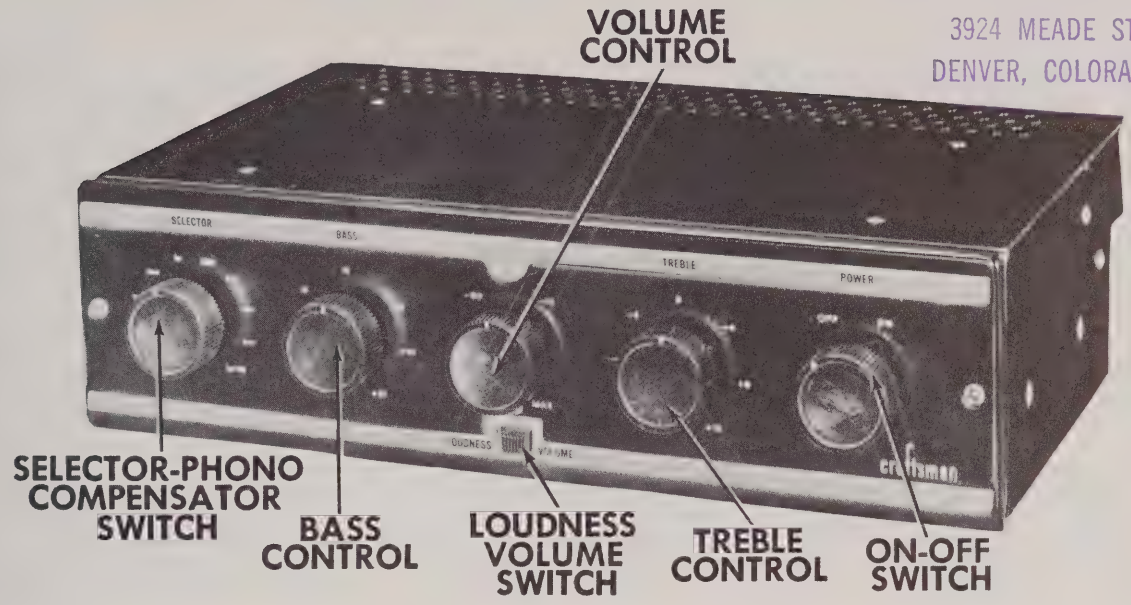
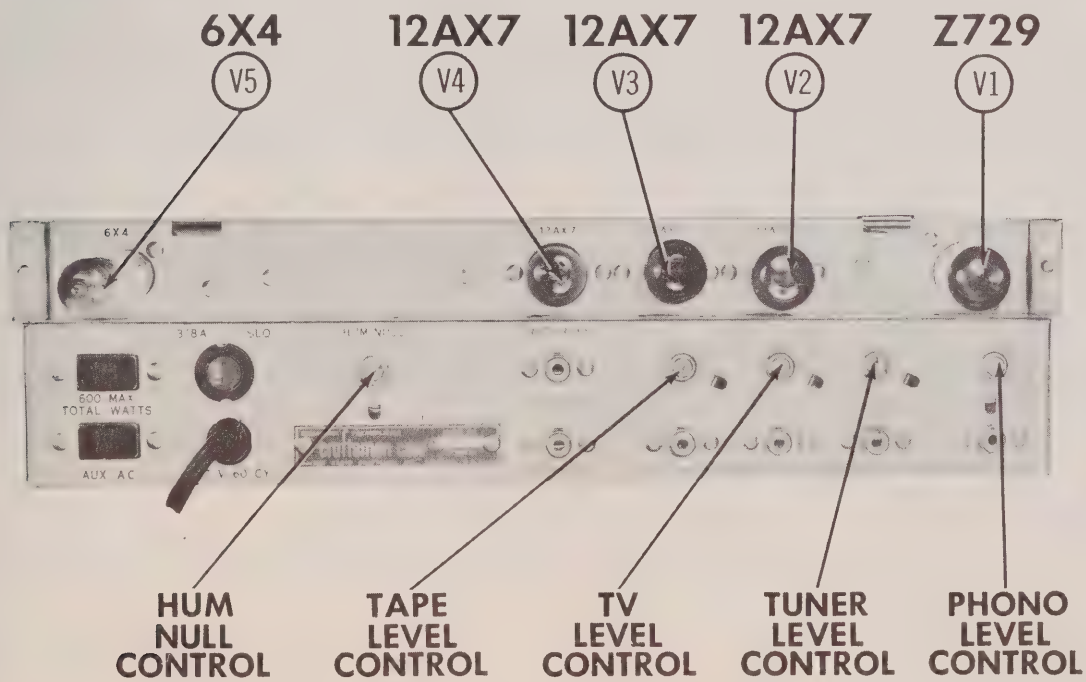


TRADE NAME	Craftsmen Model C-350
MANUFACTURER	The Radio Craftsmen, Inc., 4401 N. Ravenswood Ave., Chicago 40, Ill.
TYPE SET	AC Operated 4 Channel Equalizer-Preamplifier
TUBES (Five)	Types Z729 Pre-Amp., 12AX7 Pre-Amp-Cath. Follower, 12AX7 AF Amp., 12AX7 AF Amp.-Cath. Follower, 6X4 Rectifier
POWER SUPPLY	110-120 Volts -60 Cycles RATING .18 Amp. @ 117 Volts AC



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PARTS LIST AND DESCRIPTIONS

TUBES (SYLVANIA, GENERAL ELECTRIC, WESTINGHOUSE)

ITEM No.	USE	REPLACEMENT DATA: CRAFTSMEN PART No.	REPLACEMENT DATA: STANDARD REPLACEMENT	RETMA BASE TYPE	NOTES
V1	Phono Pre-Amp.	Z729	Z729		
V2	Phono Pre-Amp.-Cath. Follower	12AX7	12AX7	9A	
V3	AF Amplifier	12AX7	12AX7	9A	
V4	RF Amplifier-Cath. Follower	12AX7	12AX7	9A	
V5	Rectifier	6X4	6X4	5BS	

CAPACITORS

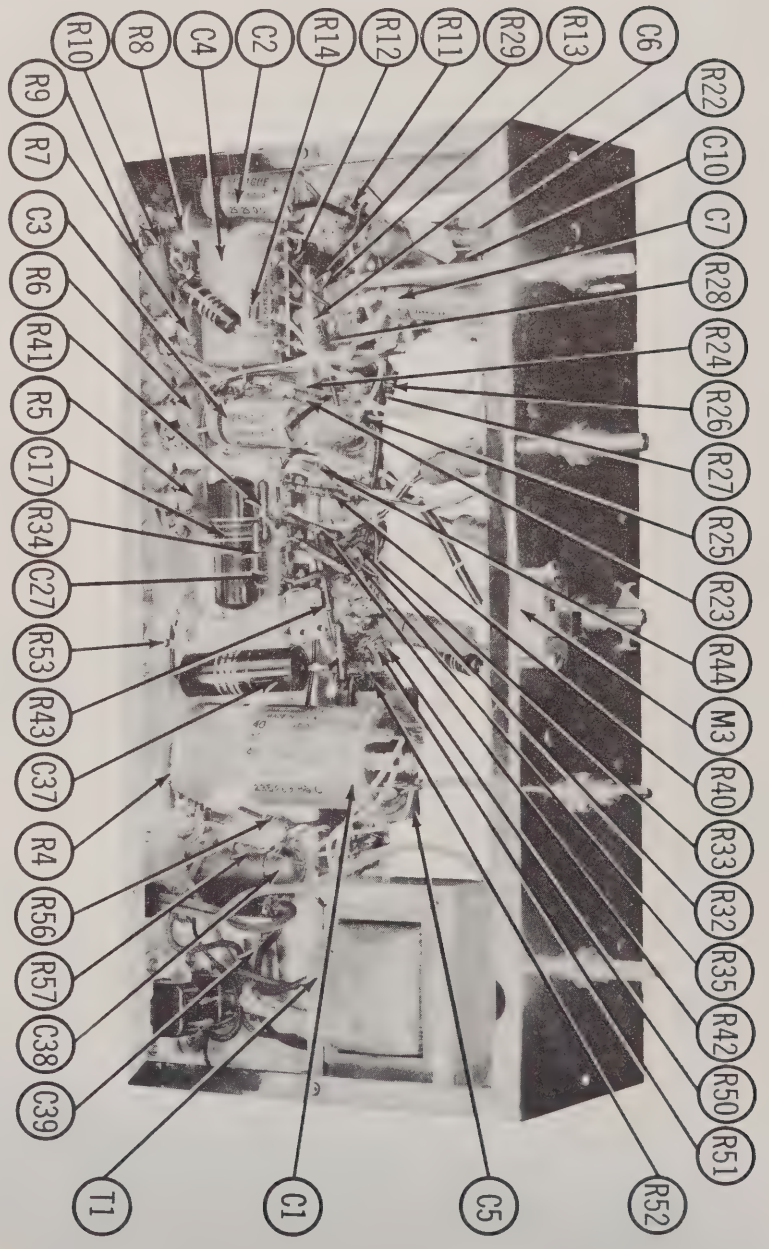
Capacity values given in the rating column are in mfd. for Electrolytic and Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING CAP.	RATING VOLT	REPLACEMENT DATA: CRAFTSMEN PART No.	CENTRALAB PART No.	ERIE PART No.	MALLORY PART No.	PYRAMID PART No.	SANGAMO PART No.
C1A	■40	350				FP377	TM-T40-450	T-170
B	▲40	350						
C	●40	350						
C2	25	25				TC26	TD-25-25	FM-0225
C3	25	25				TC26	TD-25-25	FM-0225
C4	20	450				TC75	TD-20-450	FM-4520
C5	20	450				TC75	TD-20-450	FM-4520
C6	.0033	600		D6-332	GP2-333-332	PT6233	IMP6-D33	3306233
C7	.047	400		DF-503		PT4147	IMP4-S47	3304147
C8	1500	500						CR-1215
C9	.047	400		DF-503		PT4147	IMP4-S47	3304147
C10	.0022	400						CR-1222
C11	220	500						KR-1322
C12	220	500						KR-1322
C13	330	500						KR-1330
C14	1000	500				MCE255		CR-1210
C15	.0082	400				PT4133	IMP6-S3	330413
C16	.033	400						
C17	.47	200						KR-1368
C18	680	500				MCE235		KR-1310
C19	100	500				PT4133	IMP6-S3	330413
C20	.033	400						
C21	.068	400		D6-103	GP2-333-103	PT411	IMP4-S1	330411
C22	.01	400						KR-1368
C23	680	500				MCE-235		KR-1310
C24	100	500						
C25	.1	400						KR-1370
C26	700	500				PT4015	IMP6-S15	3306115
C27	.015	400		DF-503		PT4147	IMP4-S47	3304147
C28	.047	400						
C29	.01	400						
C30	.22	400						
C31	.0047	600		D6-472	GP2-333-472	PT6247	IMP6-D47	3306247
C32	.0015	600		D6-152	GP2L-152	PT6215	IMP6-D15	3306215
C33	470	500				MCB245		KR-1347
C34	.047	400		DF-503		PT4147	IMP4-S47	3304147
C35	.047	400		DF-503		PT4147	IMP4-S47	3304147
C36	.01	400		D6-103	GP2-333-103	PT411	IMP4-S1	330411
C37	.47	200				PT4047	IMP2-P5	3302045
C38	.047	400		DF-503		PT4147	IMP4-S47	3304147
C39	.01	600		D6-103	GP2-333-103	PT611	IMP6-S1	330611

CONTROLS

ITEM No.	RATING RESISTANCE	RATING WATTS	REPLACEMENT DATA: CRAFTSMEN PART No.	IRC PART No.	CLAROSTAT PART No.	CENTRALAB PART No.	MALLORY PART No.	INSTALLATION NOTES
R1A	1Meg	½	23B745	Q18-137X	A47F1-1Meg	BT-7417	UT-440	Bass-Tapped @ 100KΩ
B	Shaft		Not Req.	Not Req.	FS-3	Not Req.	Not Req.	Attach to R1A
R2A	150KΩ	½	23B744					Panel-tapped @100KΩ Volume & 90KΩ Rear
B	500KΩ	½						
R3A	500KΩ	½	23B746	Q13-133X	A47F2-500K	BT-67	UT-430	Treble-tapped @150KΩ
B	Shaft		Not Req.	Not Req.	FS-3	Not Req.	Not Req.	Attach to R3A
R4A	2500Ω	½	23S747	Q11-112	A47-2500-S	AB-7	U-8	Hum Null
B	Shaft		Not Req.	Not Req.	FKS-1/4	AK-1	Not Req.	Attach to R4A

CHASSIS—TOP VIEW



PARTS LIST AND DESCRIPTIONS (Continued)

CONTROLS (cont)

ITEM No.	RATING		REPLACEMENT DATA					INSTALLATION NOTES
	RESISTANCE	WATTS	CRAFTSMEN PART No.	IRC PART No.	CLAROSTAT PART No.	CENTRALAB PART No.	MALLORY PART No.	
R5A	500KΩ	½	23S729	Q13-133	A47-500K-Z	AB-60	U-48	Tape level
B	Shaft		Not Req.	Not Req.	FKS-1/4	AK-1	Not Req.	Attach to R5A
R6A	500KΩ	½	23S729	Q13-133	A47-500K-Z	AB-60	U-48	TV Level
B	Shaft		Not Req.	Not Req.	FKS-1/4	AK-1	Not Req.	Attach to R6A
R7A	500KΩ	½	23S729	Q13-133	A47-500K-Z	AB-60	U-48	Tuner Level
B	Shaft		Not Req.	Not Req.	FKS-1/4	AK-1	Not Req.	Attach to R7A
R8A	500KΩ	½	23S729	Q13-133	A47-500K-Z	AB-60	U-48	Phono Level
B	Shaft		Not Req.	Not Req.	FKS-1/4	AK-1	Not Req.	Attach to R8A

RESISTORS

ITEM No.	RATING		REPLACEMENT DATA		NOTES
	OHMS	WATT	CRAFTSMEN PART No.	IRC PART No.	
R9	10KΩ	½		BTS-10K	
R10	22KΩ	½		BTS-22K	
R11	1500Ω	½		BTS-1500	
R12	82KΩ 5%	1		BTA-82K	
R13	150KΩ 5%	½		BTS-150K 5%	
R14	270KΩ 5%	½		BTS-270K 5%	
R15	13KΩ 5%	½		BTS-13K 5%	
R16	51KΩ 5%	½		BTS-51K 5%	Note 1
R17	56KΩ 5%	½		BTS-56K 5%	Note 2
R18	100KΩ 5%	½		BTS-100K 5%	
R19	4.7Meg 5%	½		BTS-4.7Meg 5%	
R20	1.3Meg 5%	½		BTS-1.3Meg 5%	
R21	8.2Meg 5%	½		BTS-8.2Meg 5%	
R22	4.7Meg 5%	½		BTS-4.7Meg 5%	
R23	1Meg	½		BTS-1Meg	
R24	1800Ω	½		BTS-1800	
R25	100KΩ 5%	½		BTS-100K 5%	
R26	470KΩ	½		BTS-470K	
R27	470KΩ	½		BTS-470K	
R28	22KΩ	½		BTS-22K	
R29	4700Ω	½		BTS-4700	
R30	6800Ω 5%	½		BTS-6800 5%	
R31	12KΩ 5%	½		BTS-12K 5%	
R32	1Meg	½		BTS-1Meg	

ITEM No.	RATING		REPLACEMENT DATA		NOTES
	OHMS	WATT	CRAFTSMEN PART No.	IRC PART No.	
R33	1000Ω 1%	½		DCH-1000	
R34	2700Ω 5%	½		BTS-2700	
R35	22KΩ	½		BTS-22K	
R36	36KΩ 1%	½			
R37	3.3KΩ 1%	½			
R38	1Meg	½		BTS-1Meg	
R39	100KΩ	½		BTS-100K	
R40	820 Ω 5%	½		BTS-820 5%	
R41	1500Ω 5%	½		BTS-1500 5%	
R42	15KΩ 1%	½		DCH-15K 1%	
R43	1000Ω 1%	½		DCH-1000 1%	
R44	18KΩ	½		BTS-18K	
R45	430KΩ 5%	½		BTS-430K 5%	
R46	10KΩ 5%	½		BTS-10K 5%	
R47	1800Ω 5%	½		BTS-1800 5%	
R48	100KΩ 5%	½		BTS-100K 5%	
R49	2200Ω	½		BTS-2200	
R50	470KΩ	½		BTS-470K	
R51	470Ω	½		BTS-470	
R52	22KΩ	½		BTS-22K	
R53	1Meg	½		BTS-1Meg	
R54	1000Ω	½		BTS-1000	
R55	1500Ω	½		BTS-1500	
R56	470KΩ	½		BTS-470K	
R57	100KΩ	½		BTS-100K	
R58	470KΩ	½		BTS-470K	
R59	2200Ω	1		BTA-2700	

Note 1. Some versions use a 15KΩ-5% resistor in this application.
Note 2. Some versions use a 50KΩ - 5% resistor in this application.

TRANSFORMER (POWER)

ITEM No.	RATING				REPLACEMENT DATA					
	PRI.	SEC. 1	SEC. 2	SEC. 3	CRAFTSMEN PART No.	Stancor PART No.	Merit PART No.	Triad PART No.	Halldorson PART No.	Thordarson PART No.
T1	117VAC @ .18A	514VCT .016ADC	6.3VAC @ .6A	6.3VAC @ 1.06A						

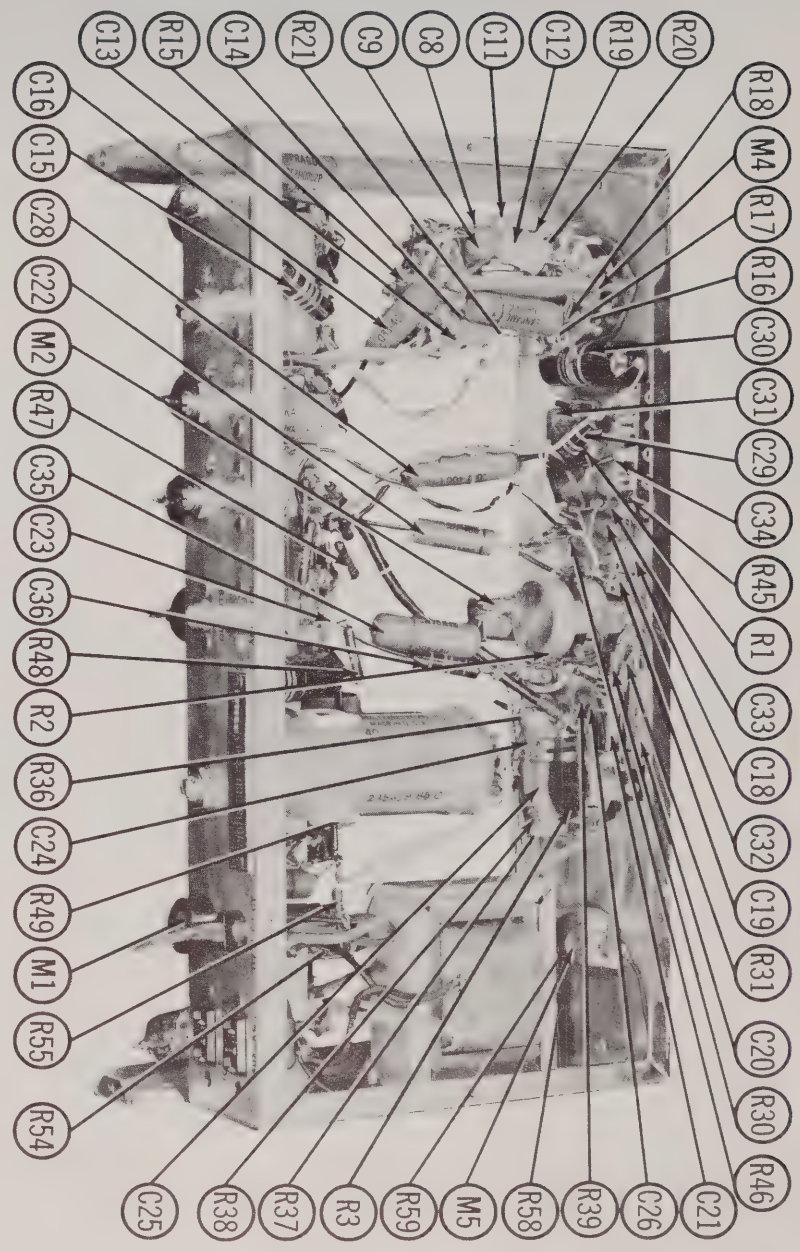
FUSES

ITEM No.	TYPE	RATING	REPLACEMENT DATA					
			CRAFTSMEN PART No.		LITTELFUSE PART No.		BUSS PART No.	
			FUSE	HOLDER	FUSE	HOLDER	FUSE	HOLDER
M1	3AG S/B	3/8A 125V			313.375 (3AG S/B 3/8A)	341001	MDL 3/8	HKP

MISCELLANEOUS

ITEM No.	PART NAME	CRAFTSMEN PART No.	NOTES
M2	Pilot Light		GE #NE51, Bayonet
M3	Switch		Loudness-volume
M4	Switch		Selector & phono compensator
M5	Switch		On-off

CHASSIS—BOTTOM VIEW



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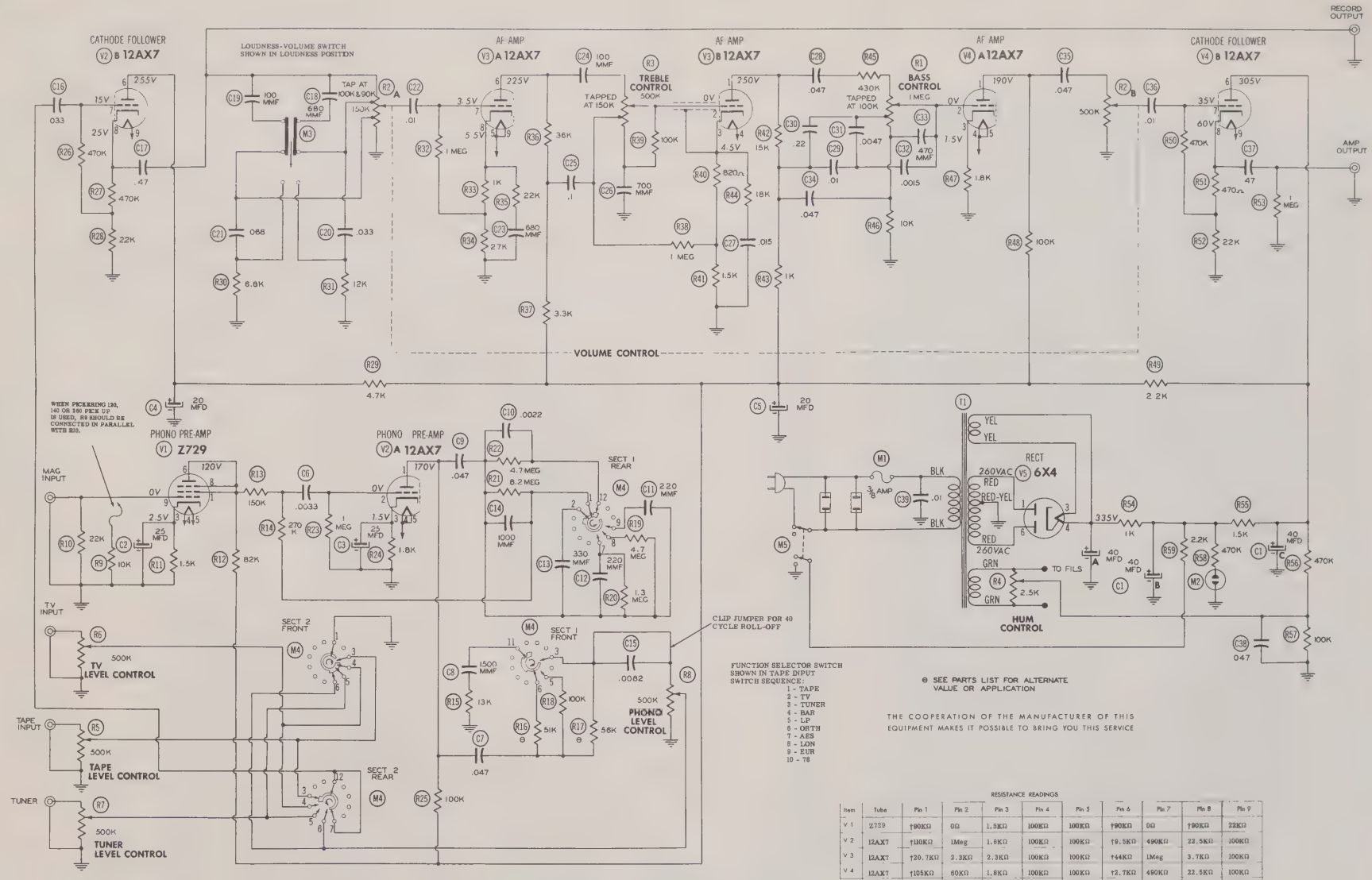
3044 MEADE ST.
DENVER, COLORADO



FUNCTION SELECTOR SWITCH SHOWN IN TAPE INPUT SWITCH SEQUENCE:
1 - TAPE
2 - TV
3 - TUNER
4 - BAR
5 - LP
6 - ORTH
7 - ARS
8 - LON
9 - EUR
10 - 78

⊖ SEE PARTS LIST FOR ALTERNATE VALUE OR APPLICATION

THE COOPERATION OF THE MANUFACTURER OF THIS EQUIPMENT MAKES IT POSSIBLE TO BRING YOU THIS SERVICE

RESISTANCE READINGS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8	Pin 9
V 1	Z729	†90KΩ	0Ω	1.5KΩ	100KΩ	100KΩ	†90KΩ	0Ω	†90KΩ	22KΩ
V 2	12AX7	†110KΩ	1Meg	1.8KΩ	100KΩ	100KΩ	†9.5KΩ	490KΩ	22.5KΩ	100KΩ
V 3	12AX7	†20.7KΩ	2.3KΩ	2.3KΩ	100KΩ	100KΩ	†44KΩ	1Meg	3.7KΩ	100KΩ
V 4	12AX7	†105KΩ	60KΩ	1.8KΩ	100KΩ	100KΩ	†2.7KΩ	490KΩ	22.5KΩ	100KΩ
V 5	6X4	600Ω	INF	3.2KΩ	3.2KΩ	INF	600Ω	3.2KΩ		

† MEASURED FROM PIN 7 OF V5

1. DC voltage measurements taken with vacuum tube voltmeter; AC voltages measured at 1000 ohms per volt.
2. Socket connections are shown as bottom views.
3. Measured values are from socket pin to common negative.
4. Line voltage maintained at 117 volts for voltage readings.
5. Nominal tolerance on component values makes possible a variation of ± 15% in voltage and resistance readings.
6. All controls at minimum, proper output load connected.

A PHOTOFACT STANDARD NOTATION SCHEMATIC

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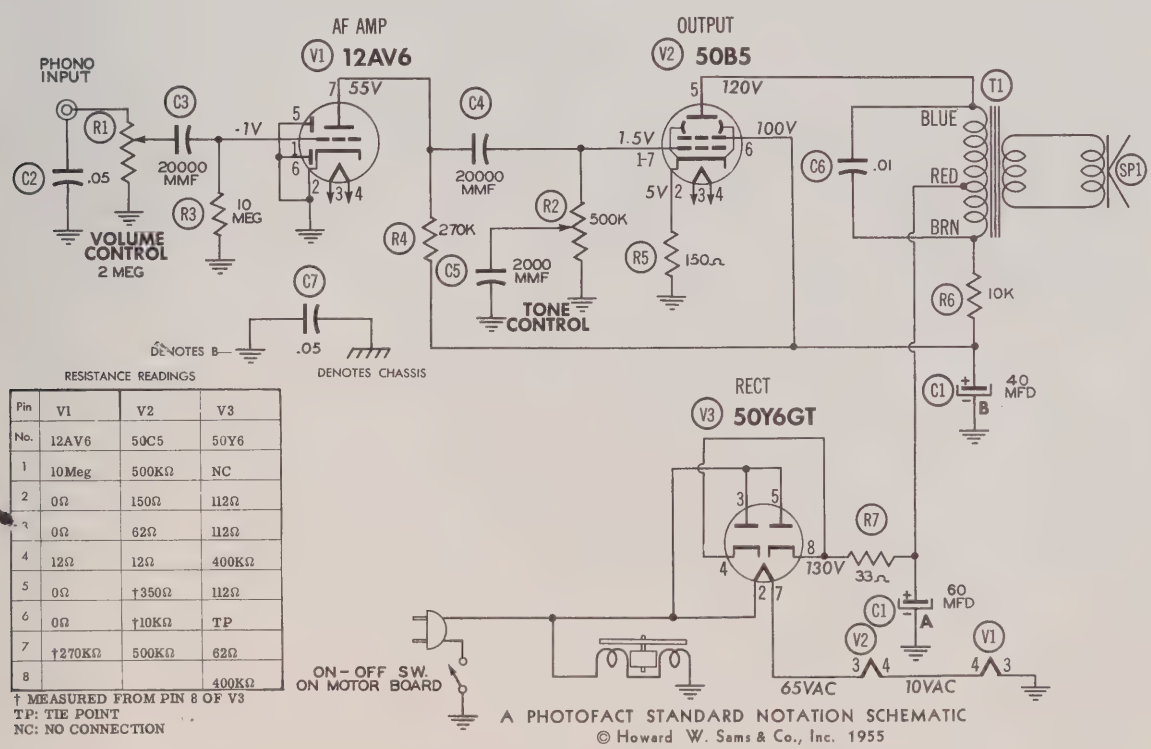
PROPERTY OF
L. F. BLANKENSHIP
3924 MEADE ST.
DENVER, COLORADO

TRADE NAME	Crescent Model 452A
MANUFACTURER	Crescent Industries, Inc., 5900 W. Touhy Ave., Chicago 31, Ill.
TYPE SET	AC Operated Phono Amplifier With 45RPM Automatic Record Changer
TUBES (Three)	Types 12AV6 AF Amp., 50B5 Output, 50Y6GT Output
POWER SUPPLY	110-120 Volts AC - 60 Cycles
RATING	.22 Amp. @ 117 Volts AC

CRESCENT
MODEL 452A



RESISTANCE READINGS

Pin No.	V1 12AV6	V2 50C5	V3 50Y6
1	10Meg	500KΩ	NC
2	0Ω	150Ω	112Ω
3	0Ω	62Ω	112Ω
4	12Ω	12Ω	400KΩ
5	0Ω	†350Ω	112Ω
6	0Ω	†10KΩ	TP
7	†270KΩ	500KΩ	62Ω
8			400KΩ

† MEASURED FROM PIN 8 OF V3
TP: TIE POINT
NC: NO CONNECTION

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PARTS LIST AND DESCRIPTIONS

TUBES (SYLVANIA, GENERAL ELECTRIC, WESTINGHOUSE)

ITEM No.	USE	REPLACEMENT DATA: CRESCENT PART No.	REPLACEMENT DATA: STANDARD REPLACEMENT	RETMA BASE TYPE	NOTES
V1	AF Amp.	12AV6	12AV6	7BT	
V2	Output	50B5	50B5	7BZ	
V3	Rectifier	50Y6GT	50Y6GT	7Q	

CAPACITORS

Capacity values given in the rating column are in mfd. for Electrolytic and Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING: CAP.	RATING: VOLT	REPLACEMENT DATA: CRESCENT PART No.	CENTRALAB PART No.	ERIE PART No.	MALLORY PART No.	PYRAMID PART No.	SANGAMO PART No.	
C1A	60	150				FP311. 6	TM-D60-150	D-080	
B	40	150							
C2	.05	400		DF-503		PT415	IMP4-S5	330415	
C3	20000			DF-203	817-02				
C4	20000			DF-203	817-02				
C5	2000			D6-202	801-002	DC522		C-1220	
C6	.01	400		D6-103	GP3-333-103	PT411	IMP4-S1	330411	
C7	.05	400		DF-503		PT415	IMP4-S5	330415	

CONTROLS

ITEM No.	RATING: RESISTANCE	RATING: WATTS	REPLACEMENT DATA: CRESCENT PART No.	IRC PART No.	CLAROSTAT PART No.	CENTRALAB PART No.	MALLORY PART No.	INSTALLATION NOTES
R1	2Meg	½	740035					Volume
R2	500KΩ	½	740058					Tone

RESISTORS

ITEM No.	RATING: OHMS	RATING: WATT	REPLACEMENT DATA: CRESCENT PART No.	REPLACEMENT DATA: IRC PART No.	NOTES
R3	10Meg	½		BTS-10Meg	
R4	270KΩ	½		BTS-270K	
R5	150Ω	1½		BTS-150	

ITEM No.	RATING: OHMS	RATING: WATT	REPLACEMENT DATA: CRESCENT PART No.	REPLACEMENT DATA: IRC PART No.	NOTES
R6	10KΩ	½		BTS-10K	
R7	33Ω	1			

TRANSFORMER (AUDIO OUTPUT)

ITEM No.	IMPEDANCE: PRI.	IMPEDANCE: SEC.	REPLACEMENT DATA: CRESCENT PART No.	Stancor PART No.	Merit PART No.	Triad PART No.	Halldorson PART No.	Thordarson PART No.	NOTES
T1	2.4KΩ	3.6Ω	700044	A-3330 ①	A-3031 ①		Z1102 ①	24S50A ①	① Drill one new mounting hole.

SPEAKER

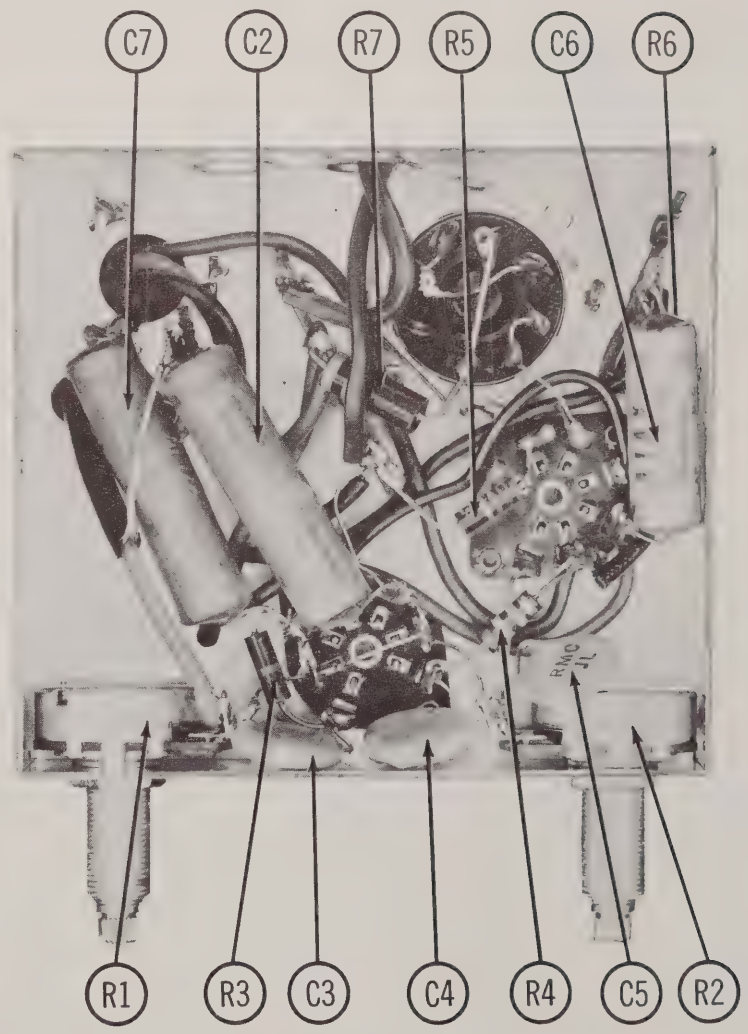
ITEM No.	RATINGS: SIZE	RATINGS: FIELD	RATINGS: V. C. IMP.	REPLACEMENT DATA: CRESCENT PART No.	VIKING PART No.	QUAM PART No.	NOTES
SP1	4" X 6"	PM	3.6Ω	011796	46J6	46A07	

PHONO CARTRIDGE

ITEM No.	REPLACEMENT DATA: CRESCENT PART No.	ASTATIC PART No.: CARTRIDGE	ASTATIC PART No.: NEEDLE	ELECTRO-VOICE PART No.: CARTRIDGE	ELECTRO-VOICE PART No.: NEEDLE	REMARKS
M1		51-1J	G-J	47	0-1 or S-1	

ASTATIC AND ELECTRO-VOICE NEEDLE LISTINGS SHOWN ABOVE ARE SPECIFIED FOR THE RESPECTIVE REPLACEMENT CARTRIDGES LISTED. FOR ORIGINAL CARTRIDGE NEEDLE REPLACEMENT SEE BELOW.

CHASSIS—BOTTOM VIEW



PHONO NEEDLE

(FOR REPLACEMENT IN ORIGINAL EQUIPMENT CARTRIDGE)

ITEM No.	REPLACEMENT DATA: CRESCENT PART No.	JENSEN PART No.	PERMO PART No.	WALCO PART No.	REMARKS
M2		*A-84LP or †A-74LP or ♦A-74LPD	*A-304 or †A-332 or ♦A-332D	†W-3MGS or ♦W-3MGD	* Metal † Jewel ♦ Diamond

PROPERTY OF
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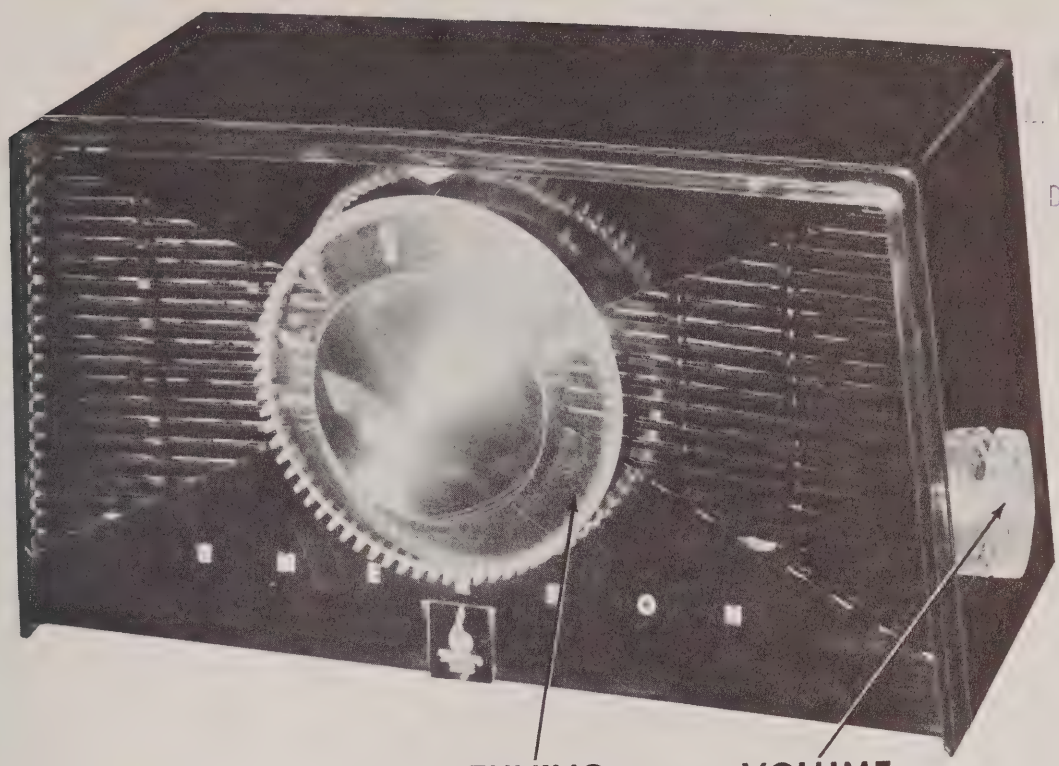
DENVER, COLORADO

EMERSON MODELS 812B
(Ch. 120229-B), 813B (Ch. 120230-B)



EMERSON MODELS 812B
(Ch. 120229-B), 813B (Ch. 120230-B)

TRADE NAME	Emerson Model 812B (Ch. 120229-B), 813B (Ch. 120230-B)
MANUFACTURER	Emerson Radio & Phono Corp., 111 Eighth Ave., New York 11, N.Y.
TYPE SET	AC-DC Operated AM Superheterodyne Receiver
TUBES (Five)	Types 12BE6 Conv., 12BA6 IF Amp., 12AV6 Det.-AVC-AF Amp., 50C5 Output, 35W4 Rectifier
POWER SUPPLY	105-125 Volts AC-DC — RATING .23 Amp. @ 117 Volts AC
TUNING RANGE—BROADCAST	540KC-1620KC

ALIGNMENT INSTRUCTIONS—READ CAREFULLY BEFORE ATTEMPTING ALIGNMENT

Volume control should be at maximum position. Output of signal generator should be no higher than necessary to obtain an output reading. Use an insulated alignment screwdriver for adjusting.
Loop should be maintained in same relative position to chassis as when receiver is in cabinet.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	RADIO DIAL SETTING	OUTPUT METER	ADJUST	REMARKS
1.	.005MFD	High side to pin 7 (grid) of 12BE6 (V1). Low side to B-.	455KC (400~Mod)	Tuning gang fully open	Across voice coil	A1, A2, A3, A4	Adjust for maximum output. If isolation transformer is not used, reduce dummy antenna to .001MFD to reduce hum modulation.
2.	Direct	Loop	1620KC	"	"	A5	Fashion loop of several turns of wire and radiate signal into loop of receiver. Adjust for maximum output.
3.	"	"	1400KC	Tune to 1400KC signal	"	A6	"

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PARTS LIST AND DESCRIPTIONS

EMERSON
MODEL 812B (Ch. 120229-B)

PARTS LIST AND DESCRIPTIONS (Continued)

TUBES (SYLVANIA, GENERAL ELECTRIC, WESTINGHOUSE)

ITEM No.	USE	REPLACEMENT DATA: EMERSON PART No.	REPLACEMENT DATA: STANDARD REPLACEMENT	RETMA BASE TYPE	NOTES
V1	Converter	12BE6	12BE6	7CH	
V2	IF Amplifier	12BA6	12BA6	7BK	
V3	Det.-AVC-AF Amp.	12AV6	12AV6	7BT	
V4	Output	50C5	50C5	7CV	
V5	Rectifier	35W4	35W4	5BQ	

CAPACITORS

Capacity values given in the rating column are in mfd. for Electrolytic and Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING: CAP.	RATING: VOLT	REPLACEMENT DATA: EMERSON PART No.	CENTRALAB PART No.	ERIE PART No.	MALLORY PART No.	PYRAMID PART No.	SANGAMO PART No.	
C1A	50	150	925278			TCD497	TDL-5030-150	FMD-301	
B	30	150							
C2	10000		928027	DD-103	811-01	DC-511			
C3	.047	400	923554	DF-503		PT4147	IMP4-S47	3304147	
C4A	220		♦923028						
B	2000								
C	5000								
D	500								
E									
C5	.02	400	923524	DF-203	817-02	PT412	IMP4-S2	330412	
C6	.047	400	923554	DF-503		PT4147	IMP4-S47	3304147	
C7	.047	400	923554	DF-503		PT4147	IMP4-S47	3304147	

♦ Items C4A, C4B, C4C, C4D, C4E, R6A, R6B, R6C are combined in one unit.
When replacing items separately C4D and C4E should total 500MMF.

CONTROLS

ITEM No.	RATING: RESISTANCE	RATING: WATTS	REPLACEMENT DATA: EMERSON PART No.	IRC PART No.	CLAROSTAT PART No.	CENTRALAB PART No.	MALLORY PART No.	INSTALLATION NOTES
R1	500KΩ	½	390295					Volume & switch - Note

Note . Model 813B may use an alternate control part #390278.

RESISTORS

ITEM No.	RATING: OHMS	RATING: WATT	REPLACEMENT DATA: EMERSON PART No.	IRC PART No.	NOTES
R2	22KΩ	½	340812	BTS-22K	
R3	220KΩ	½	351052	BTS-220K	
R4	120Ω	½	340272	BTS-120	
R5	3.3Meg	½	351332	BTS-3.3Meg	

ITEM No.	RATING: OHMS	RATING: WATT	REPLACEMENT DATA: EMERSON PART No.	IRC PART No.	NOTES
R6A	6.8Meg	½	♦923028	BTS-6.8Meg	
B	470KΩ	½		BTS-470K	
C	470KΩ	½		BTS-470K	
R7	150Ω	½	340292	BTS-150	
R8	1500Ω	1	380532	BTA-1500	

♦ Items R6A, R6B, R6C, C4A, C4B, C4C and C4D are combined in one unit.

TRANSFORMER (AUDIO OUTPUT)

ITEM No.	IMPEDANCE: PRI.	IMPEDANCE: SEC.	REPLACEMENT DATA: EMERSON PART No.	Stancor PART No.	Merit PART No.	Triad PART No.	Halldorson PART No.	Thordarson PART No.	NOTES
T1	2.4KΩ	1.6Ω	734097					26S60 ①	① Drill one new mounting hole.
	2.4KΩ	3.2Ω	734098 ②	A-3332	A-3025	S-12X	Z1101	26S58	② Used in Model 813B

SPEAKER

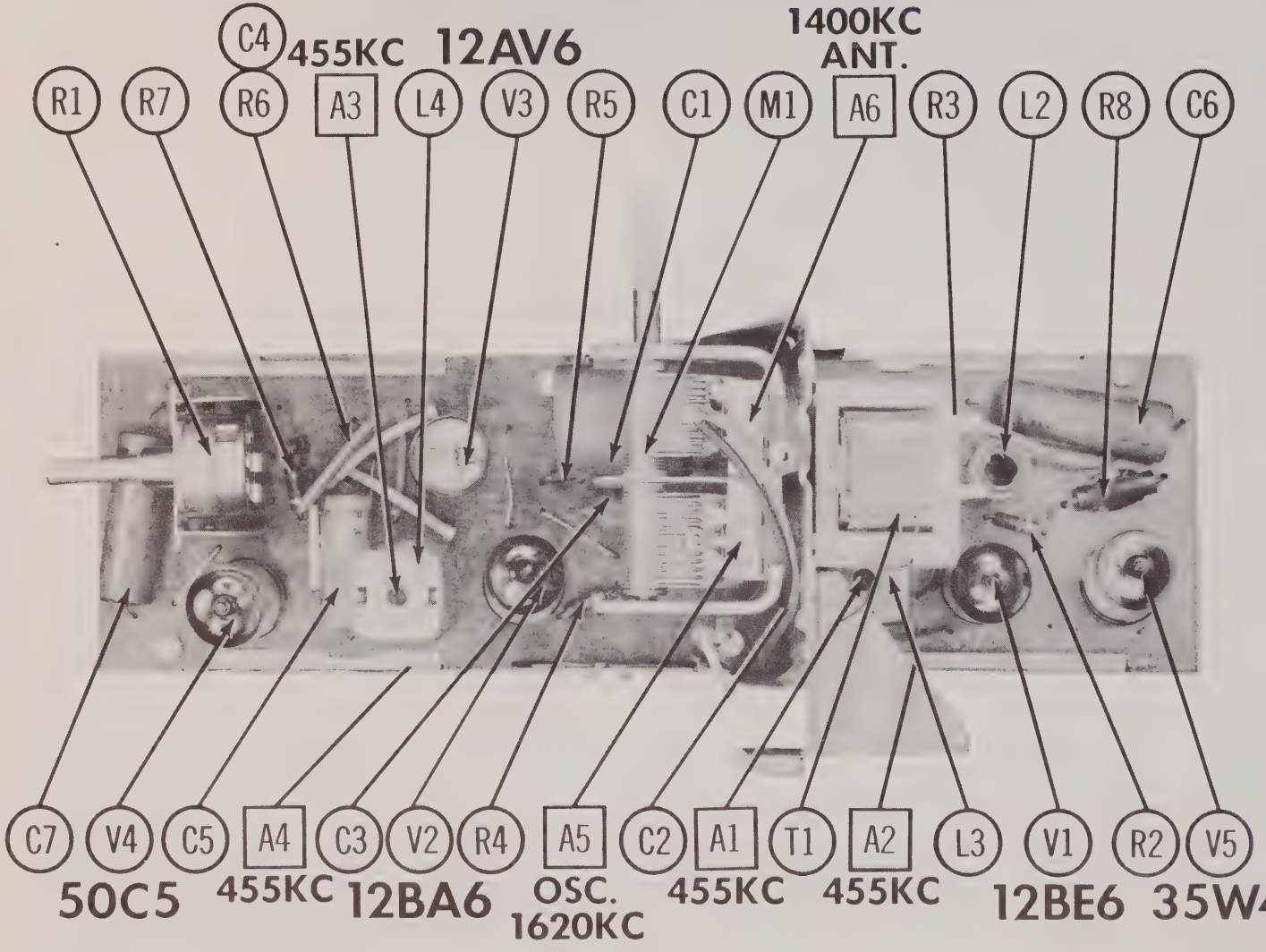
ITEM No.	RATINGS: SIZE	RATINGS: FIELD	RATINGS: V. C. IMP.	REPLACEMENT DATA: EMERSON PART No.	JENSEN PART No.	QUAM PART No.	NOTES
SP1	4"	PM	3.3Ω	180-133 ①	ST-113 Mod. P4-X	4A07	① Speakers connected in parallel
SP2	4"	PM	3.3Ω	180-133 ①	ST-113 Mod. P4-X	4A07	② Speakers used in Model 813B
	4"	PM	3.2Ω	180-112 ②	ST-113 Mod. P4-X	4A07	

COILS (RF-IF)

ITEM No.	USE	DC RES.: PRI.	DC RES.: SEC.	REPLACEMENT DATA: EMERSON PART No.	MEISSNER PART No.	MERIT PART No.	MILLER PART No.	NOTES
L1	Loop Ant.	3.3Ω		700096				Includes cabinet back
L2	Osc. Coil	.8Ω	1Ω	716094				
L3	Input IF	17Ω	17Ω	720187	16-6758	BC-352	13-PC1	
L4	Output IF	17Ω	17Ω	720187	16-6758	BC-353	13-PC2	

MISCELLANEOUS

ITEM No.	PART NAME	EMERSON PART No.	NOTES
M1	Tuning Cap.	900121	2 Gang (13-375MMF, 27-170MMF)
	Cabinet	140592	Ebony - Model 812B
	Cabinet	140603B	Ebony - Model 813B
	Cabinet	140592A	Forest Green - Model 812B
	Cabinet	140603C	Forest Green - Model 813B
	Cabinet	140592B	French Grey - Model 812B
	Cabinet	140603D	French Grey - Model 813B
	Cabinet	140592C	Ivory - Model 812B
	Cabinet	140603A	Ivory - Model 813B
	Cabinet	140603	Mahogany - Model 813B
	Knob	460587	Dial - Model 812B
	Knob	460576	Dial - Model 813B
	Knob	460588	On-off-volume - Model 812B
	Knob	460577	On-off-volume - Model 813B
	Baffle & Grille Cloth Assy.	470762	Model 812B
	Metal Grille	411875	Model 813B



CHASSIS-TOP VIEW

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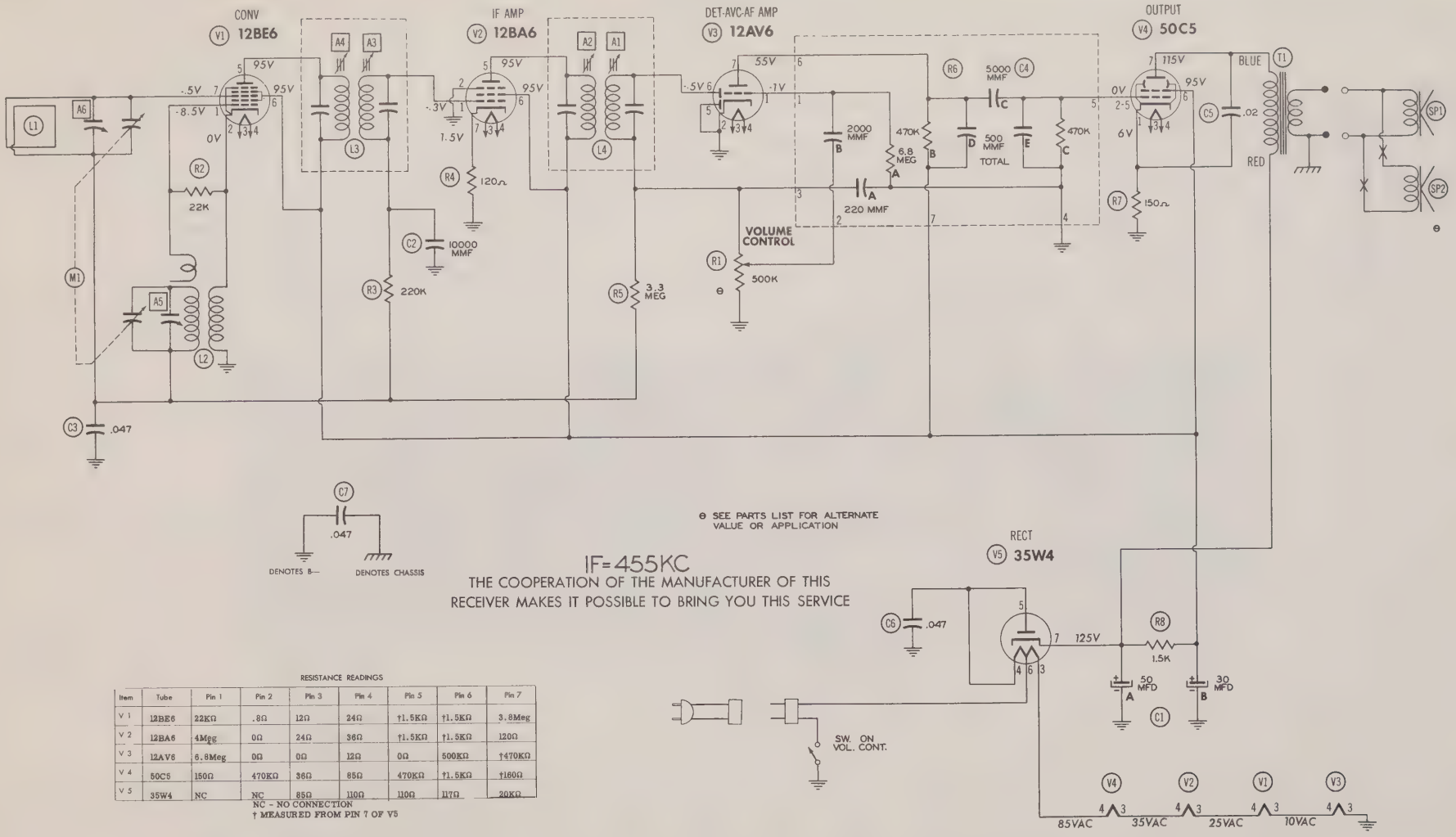
SET 272 FOLDER6



θ SEE PARTS LIST FOR ALTERNATE VALUE OR APPLICATION

IF=455KC

THE COOPERATION OF THE MANUFACTURER OF THIS RECEIVER MAKES IT POSSIBLE TO BRING YOU THIS SERVICE

RESISTANCE READINGS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7
V 1	12BE6	22KΩ	.8Ω	12Ω	24Ω	†1.5KΩ	†1.5KΩ	3.8Meg
V 2	12BA6	4Meg	0Ω	24Ω	36Ω	†1.5KΩ	†1.5KΩ	120Ω
V 3	12AV6	6.8Meg	0Ω	0Ω	12Ω	0Ω	500KΩ	†470KΩ
V 4	50C5	150Ω	470KΩ	36Ω	85Ω	470KΩ	†1.5KΩ	†160Ω
V 5	35W4	NC	NC	85Ω	110Ω	110Ω	117Ω	20KΩ

NC - NO CONNECTION
† MEASURED FROM PIN 7 OF V5

1. DC voltage measurements taken with vacuum tube voltmeter; AC voltages measured at 1000 ohms per volt.
2. Socket connections are shown as bottom views.
3. Measured values are from socket pin to common negative.
4. Line voltage maintained at 117 volts for voltage readings.
5. Nominal tolerance on component values makes possible a variation of ± 15% in voltage and resistance readings.
6. Volume control at maximum, no signal applied for voltage measurements.

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MASCO
MODEL ST-5

MASCO
MODEL ST-5

TRADE NAME	Masco Model ST-5
MANUFACTURER	Mark Simpson Mfg.Co., Inc., 32-28 49th. St., Long Island City 3, N.Y.
TYPE SET	AC-DC Operated Intercommunication System Master Unit
TUBES (Three)	Types 12AT6 AF Amp., 50C5 Output, 35W4 Rectifier
POWER SUPPLY	110-120 Volts AC-DC RATING .18 Amp. @ 117 Volts AC

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PARTS LIST AND DESCRIPTIONS

MASCO MODEL ST-5

TUBES (SYLVANIA, GENERAL ELECTRIC, WESTINGHOUSE)

ITEM No.	USE	REPLACEMENT DATA: MASCO PART No.	REPLACEMENT DATA: STANDARD REPLACEMENT	RETMA BASE TYPE	NOTES
V1	AF Amplifier	12AT6	12AT6	7BT	
V2	Output	50C5	50C5	7CV	
V3	Rectifier	35W4	35W4	5BQ	

CAPACITORS

Capacity values given in the rating column are in mfd. for Electrolytic and Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING: CAP.	RATING: VOLT	REPLACEMENT DATA: mMASCO PART No.	CENTRALAB PART No.	ERIE PART No.	MALLORY PART No.	PYRAMID PART No.	SANGAMO PART No.	
C1A	40	150				TCT3116	TDL-404020-150	FMT-315	
B	40	150							
C	20	150							
C2	5000			DD-502	811-005	DC-525	IMP6-D5	C-1250	
C3	5000			DD-502	811-005	DC-525	IMP6-D5	C-1250	
C4	.02	600		DF-203	817-02	PT612	IMP6-S2	330622	
C5	.1	600		DF-104		PT601	IMP6-P1	330601	

CONTROLS

ITEM No.	RATING: RESISTANCE	RATING: WATTS	REPLACEMENT DATA: MASCO PART No.	IRC PART No.	CLAROSTAT PART No.	CENTRALAB PART No.	MALLORY PART No.	INSTALLATION NOTES
R1A	500KΩ	½	6163925	Q13-133	A47-500K-Z	B-60-S	U-48	Volume
B	Shaft		Not Req.	Not Req.	RS-2	Not Req.	Not Req.	Attach to R1A
C	Switch		Not Req.	76-1	SWE-12	Not Req.	US-26	Attach to R1A

RESISTORS

ITEM No.	RATING: OHMS	RATING: WATT	REPLACEMENT DATA: MASCO PART No.	REPLACEMENT DATA: IRC PART No.	NOTES
R2	10Meg	½		BTS-10Meg	
R3	470KΩ	½		BTS-470K	
R4	470KΩ	½		BTS-470K	
R5	150Ω	½		BTS-150	
R6	47KΩ	½		BTS-47K	

ITEM No.	RATING: OHMS	RATING: WATT	REPLACEMENT DATA: MASCO PART No.	REPLACEMENT DATA: IRC PART No.	NOTES
R7	47KΩ	½		BTS-47K	
R8	150Ω	½		BTS-150	
R9	10KΩ	½		BTS-10K	
R10	280Ω	7			

TRANSFORMER (AUDIO OUTPUT)

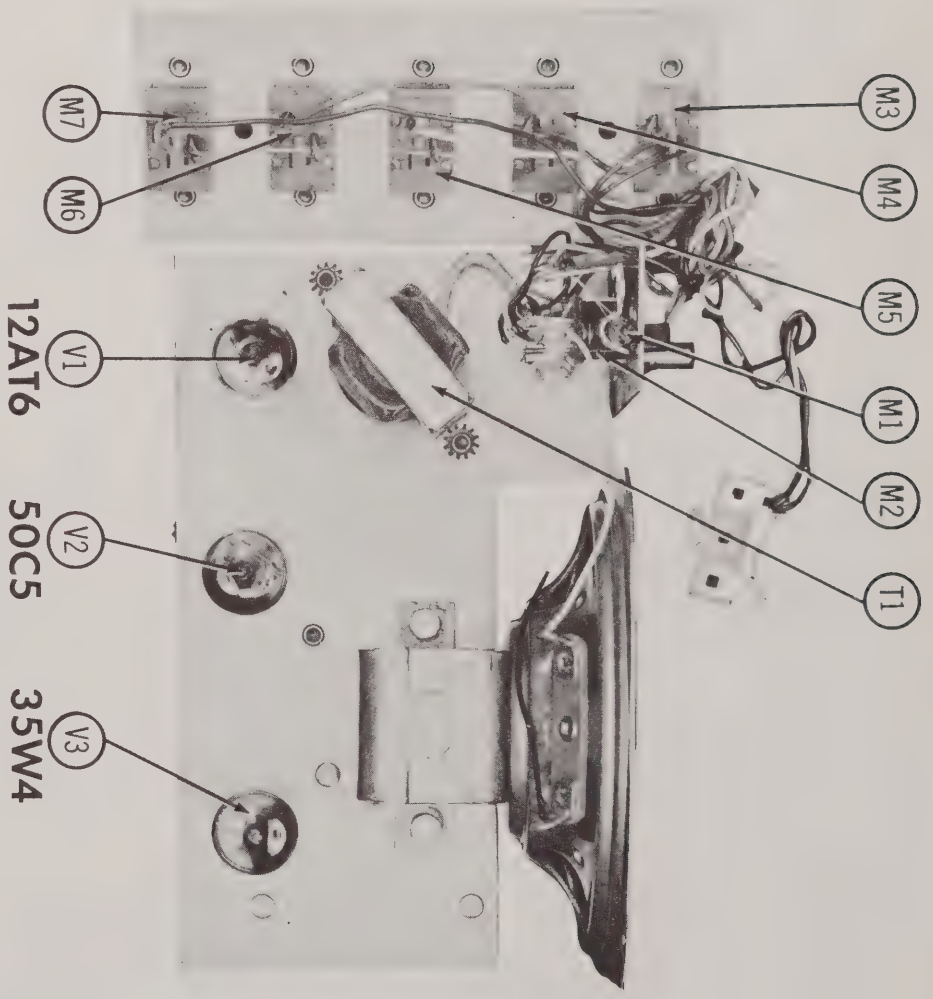
ITEM No.	IMPEDANCE: PRI.	IMPEDANCE: SEC.	REPLACEMENT DATA: MASCO PART No.	Stancor PART No.	Merit PART No.	Triad PART No.	Halldorson PART No.	Thordarson PART No.	NOTES
T2	2.3KΩ	3.3Ω	37A2	A-3332	A-3025	S-12X	Z1101	26S58	

TRANSFORMER (POWER)

ITEM No.	RATING: PRI.	RATING: SEC. 1	RATING: SEC. 2	RATING: SEC. 3	REPLACEMENT DATA: MASCO PART No.	Stancor PART No.	Merit PART No.	Triad PART No.	Halldorson PART No.	Thordarson PART No.
T1	.53Ω	700Ω			37A1		A-2923 ①	A-7J ①		20A30 ①
	TURNS RATIO 1 to 125									

① Drill one new mounting hole.

CHASSIS—TOP VIEW



PARTS LIST AND DESCRIPTIONS (Continued)

SPEAKER

ITEM No.	RATINGS			REPLACEMENT DATA			NOTES
	SIZE	FIELD	V. C. IMP.	MASCO PART No.	JENSEN PART No.	QUAM PART No.	
SP1	4"	PM	3.3Ω	1360	ST-113 Mod. P4-X	4A1	

MISCELLANEOUS

ITEM No.	PART NAME	MASCO PART No.	NOTES
M1 M2 M3	Pilot Light Switch Switch Assy.		NE #2 Talk-listen Remote station selector

CHASSIS—BOTTOM VIEW

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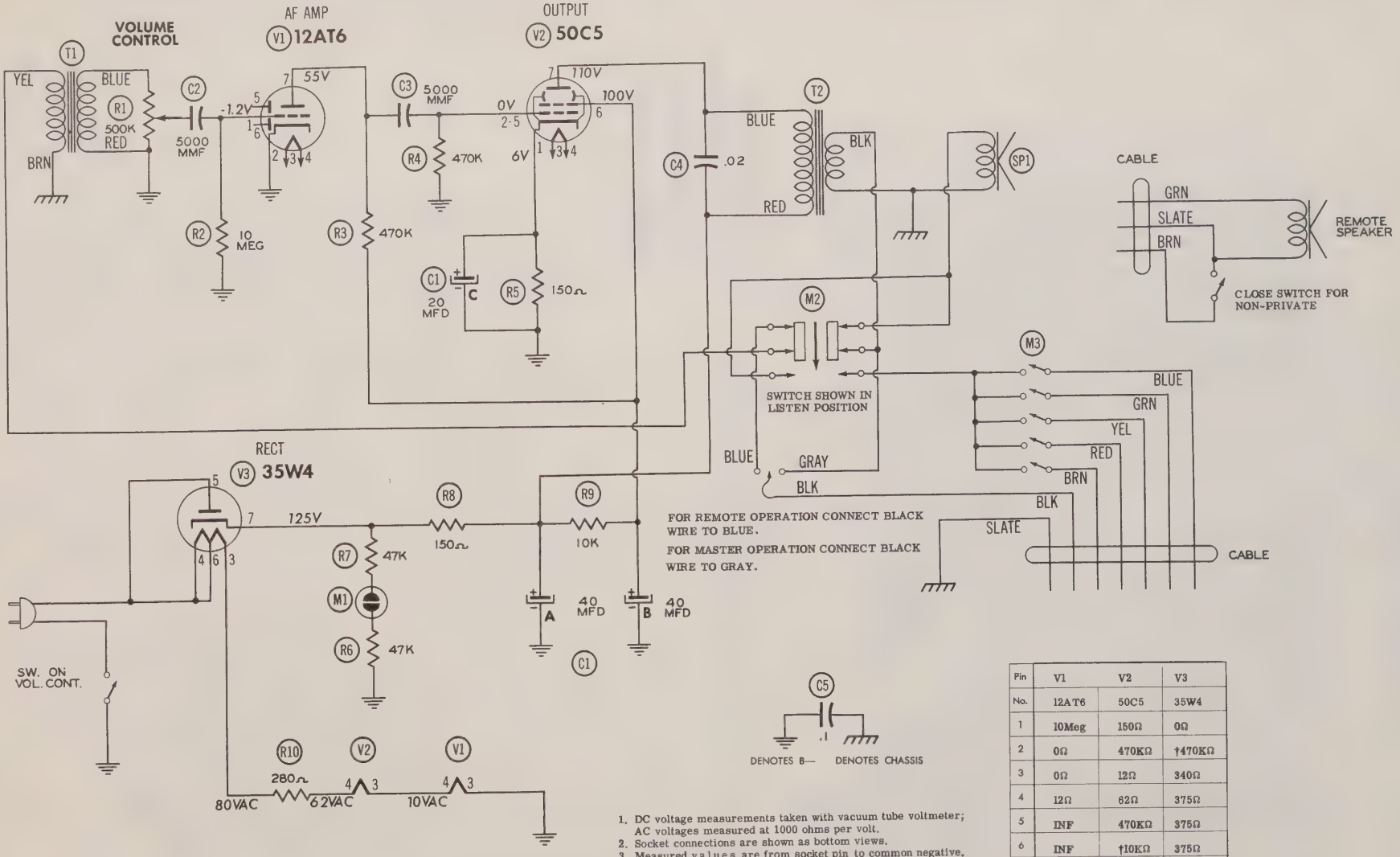
MASCO
MODEL ST-5



1. DC voltage measurements taken with vacuum tube voltmeter; AC voltages measured at 1000 ohms per volt.
2. Socket connections are shown as bottom views.
3. Measured values are from socket pin to common negative.
4. Line voltage maintained at 117 volts for voltage readings.
5. Nominal tolerance on component values makes possible a variation of ± 15% in voltage and resistance readings.
6. All controls at minimum, proper output load connected.

Pin No.	V1 12AT6	V2 50C5	V3 35W4
1	10Meg	150Ω	0Ω
2	0Ω	470KΩ	†470KΩ
3	0Ω	12Ω	340Ω
4	12Ω	62Ω	375Ω
5	INF	470KΩ	375Ω
6	INF	†10KΩ	375Ω
7	†480KΩ	†360Ω	160KΩ

† MEASURED FROM PIN 7 OF V3
ALL READINGS IN "LISTEN" POSITION

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PHOTOFACT* Folder

MOTOROLA MODELS
21K20, B, Y21K20, B, 21T18, B, Y21T18, B

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MODEL 21T18

MOTOROLA MODELS
21K20, B, Y21K20, B, 21T18, B, Y21T18, B

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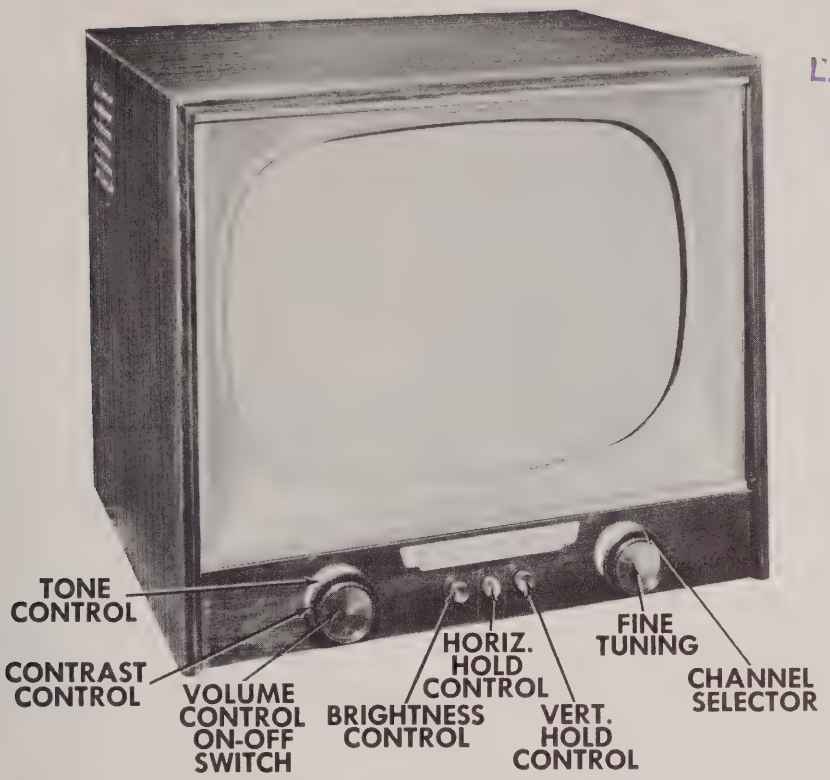

MOTOROLA MODEL 21T18 (Ch. RTS-525A-03)

TRADE NAME	MOTOROLA MODELS	CHASSIS	TUNER
	21K20, B	WTS-525, A-00, A-01, A-02, A-03	VHF
	21T18, B	RTS-525, A-00, A-01, A-02, A-03	VHF
	Y21K20, B	WTS-525Y, A-00, A-01, A-02, A-03	VHF-UHF
	Y21T18, B	RTS-525Y, A-00, A-01, A-02, A-03	VHF-UHF

MANUFACTURER	Motorola Inc., 4545 Augusta Blvd., Chicago, Ill.
TYPE SET	Television Receiver
TUBES	Nineteen
POWER SUPPLY	110-120 Volts AC - 60 Cycle RATING 1.22 Amp. @ 117 Volts AC
TUNING RANGE	Channels 2 thru 13 VHF, 14 thru 83 UHF, Video IF 45.75MC, Sound IF 41.25MC (Intercarrier)

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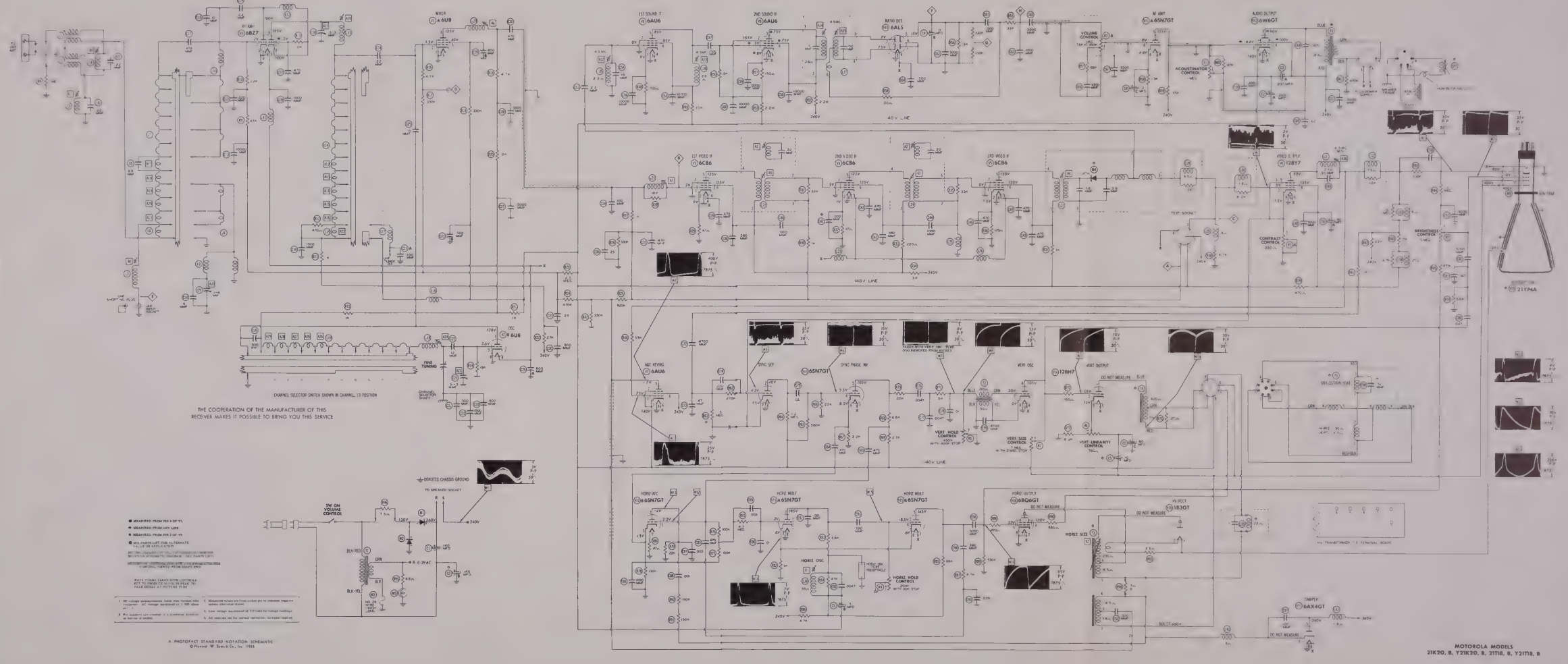
MOTOROLA MODELS
21K20, B, Y21K20, B, 21T18, B, Y21T18, B


MOTOROLA MODELS
21K20, B, Y21K20, B, 21T18, B, Y21T18, B
THE COOPERATION OF THE MANUFACTURER OF THIS RECEIVER MAKES IT POSSIBLE TO BRING YOU THIS SERVICE
CHANNEL SELECTOR SWITCH SHOWN IN CHANNEL 13 POSITION
A PHOTOFACT STANDARD NOTATION SCHEMATIC
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MOTOROLA MODELS
21K20, B, Y21K20, B, 21T18, B, Y21T18, B

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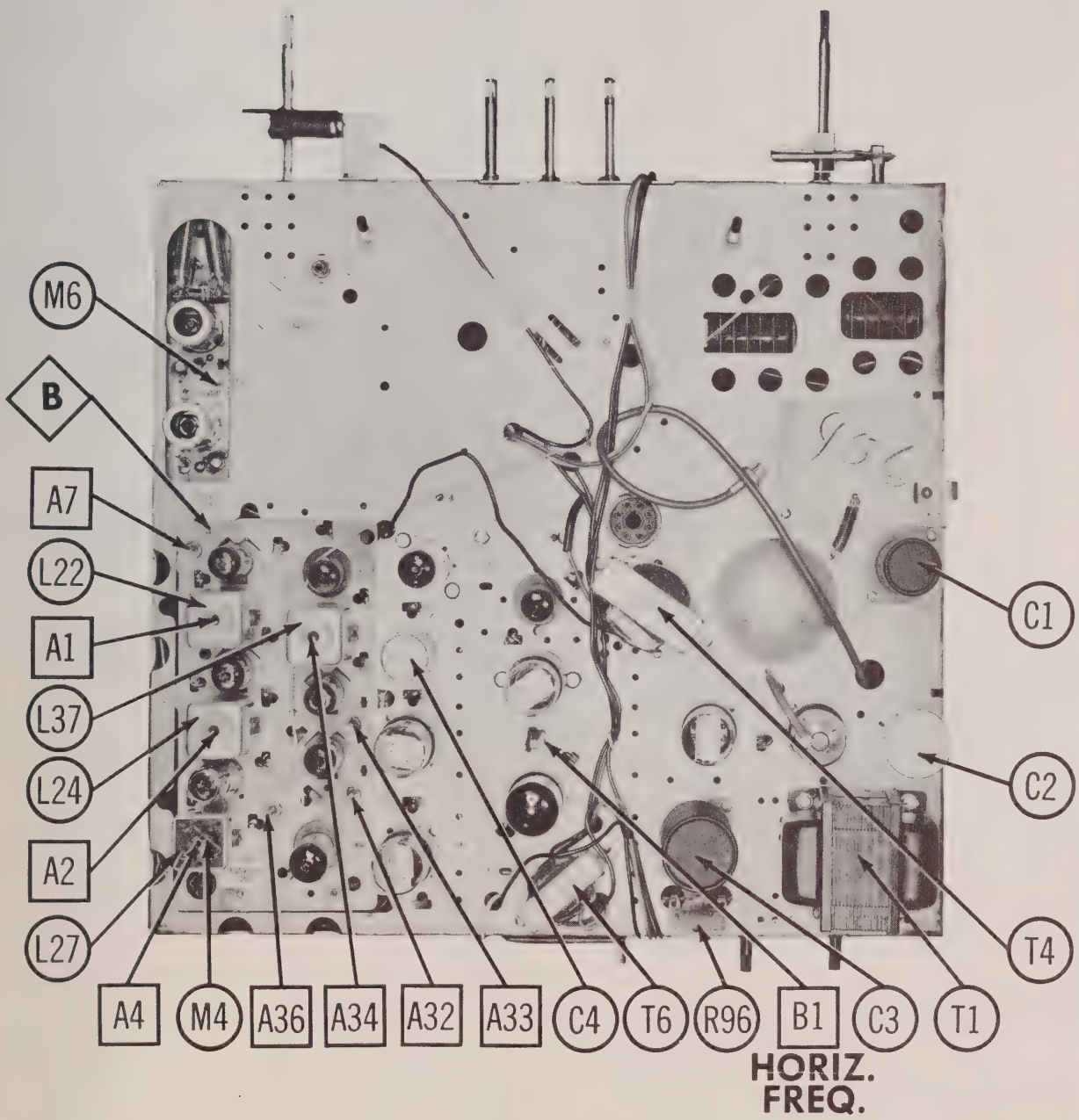
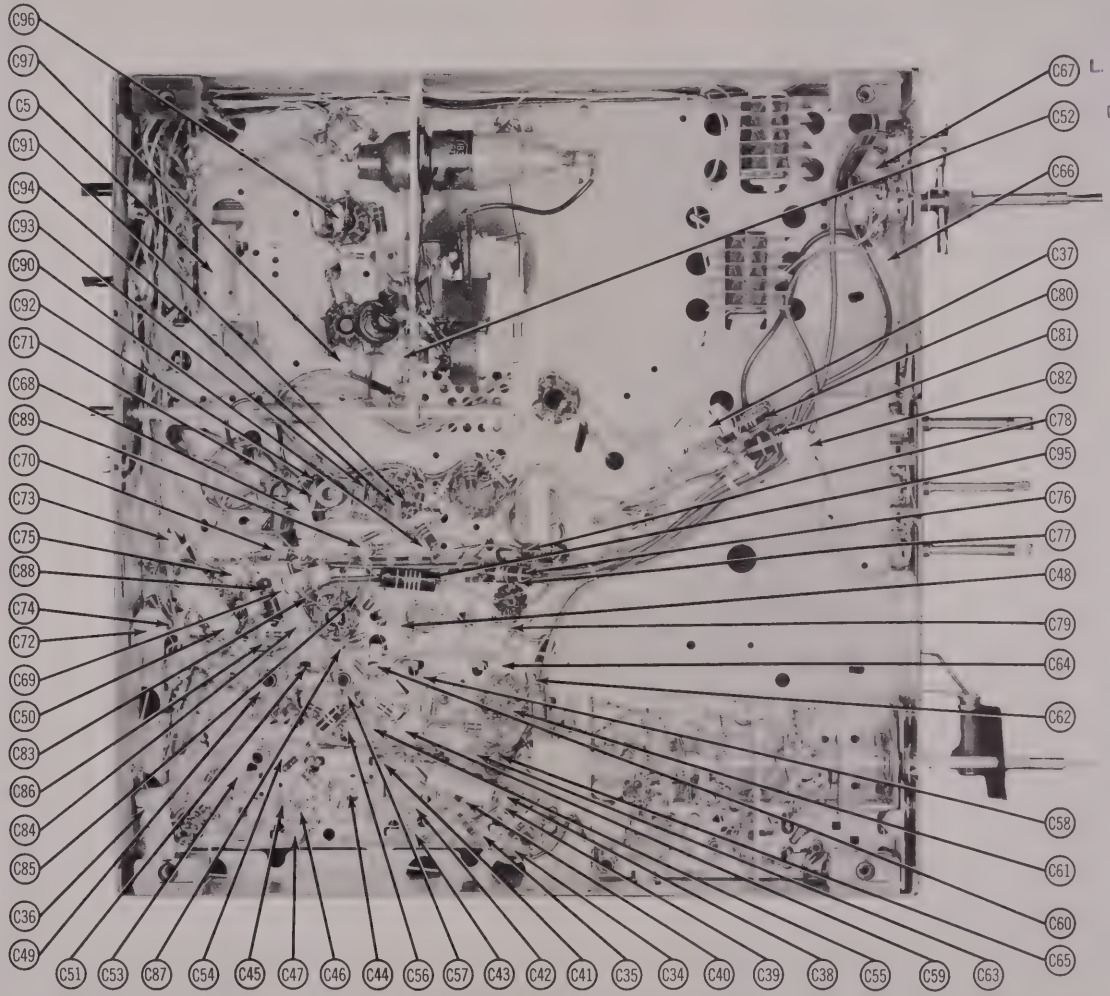


CHASSIS TOP VIEW



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CHASSIS BOTTOM VIEW-CAPACITOR IDENTIFICATION

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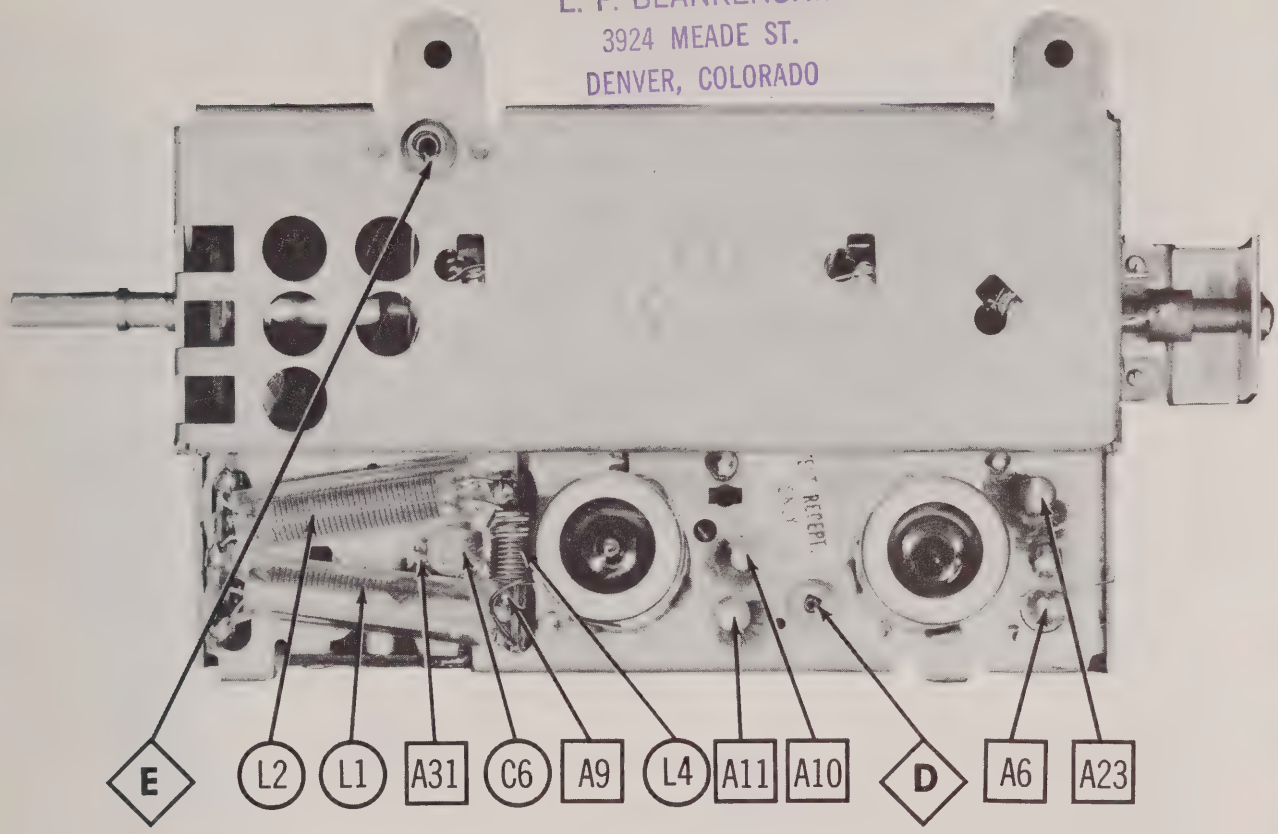
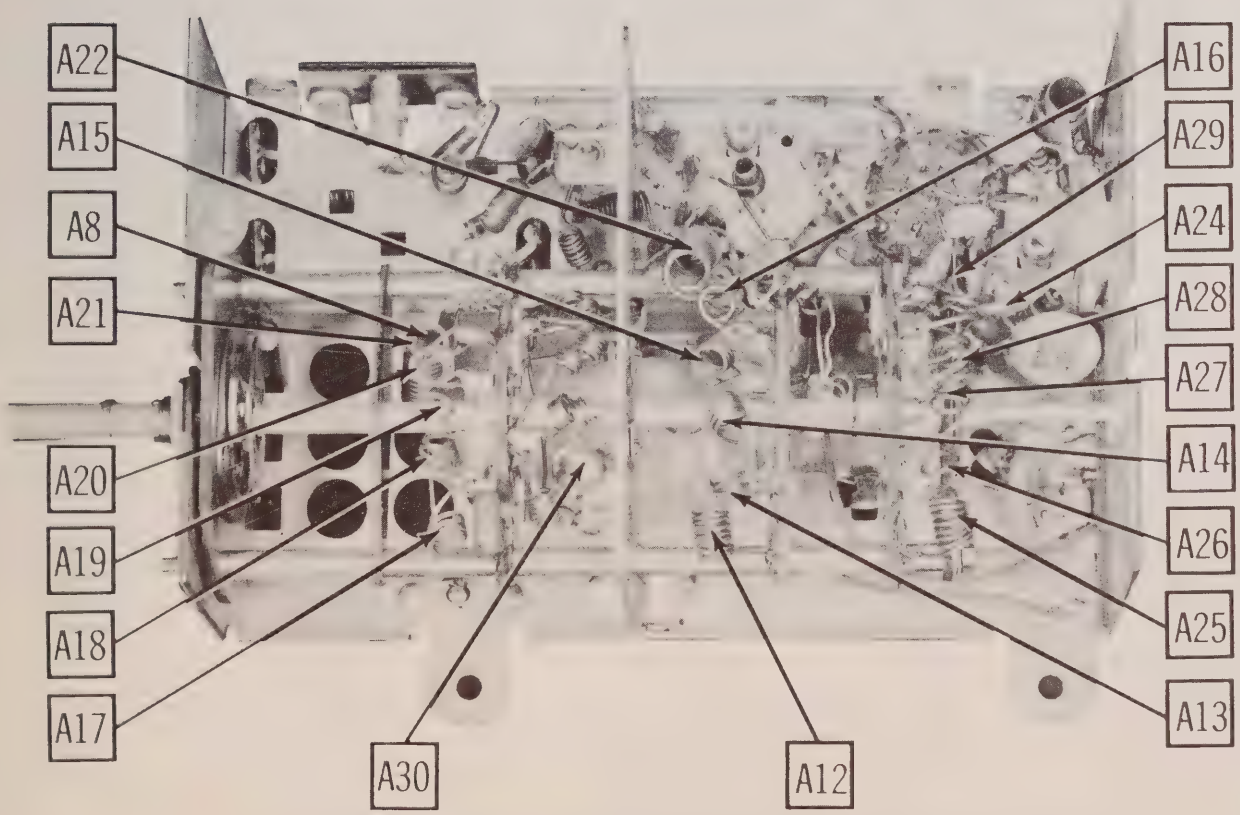


RF TUNER-TOP VIEW



RF TUNER-BOTTOM VIEW ALIGNMENT IDENTIFICATION

ALIGNMENT INSTRUCTIONS

ALIGNMENT INSTRUCTIONS—READ CAREFULLY BEFORE ATTEMPTING ALIGNMENT

Remove the horiz. output tube V16 from its socket. This will eliminate the high voltage shock hazard and reduce scope interference during alignment. Place a 2500Ω 10 watt resistor from 240V B+ to chassis to stabilize voltages during alignment.

VIDEO IF ALIGNMENT

Connect the negative lead of a 6 volt battery to point Ⓐ. Positive side of battery to chassis.
Disable local oscillator by shorting pin 9 (grid) of V2 (6U8) to chassis with short lead.
Connect the synchronized sweep voltage from the sweep generator to the horizontal input of the oscilloscope for horizontal deflection.
Attenuate the sweep generator to maintain 3 to 5 volts peak to peak at point Ⓒ. If sweep generator has no built in markers, loosely couple the output of an accurately calibrated AM signal generator to the video IF strip.
The IF coils and traps have two points of resonance. The correct settings are with the cores away from the center of the coil form so as not to affect coupling between coil and trap windings.

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
1.	.001MFD	High side to point Ⓑ. Low side to chassis. Use short leads as possible	44MC (10MC Swp)	41.25MC	13	Vert. Amp. thru 47KΩ to point Ⓒ. Low side to chassis	A1	Adjust so that notch falls at 41.25MC. Use sufficient generator output so that trap notch is clearly defined. (Fig.1).
2.	"	"	"	47.25MC	"	"	A2	Adjust so that trap notch falls at 47.25MC. Temporarily remove the -6 volts bias to provide better trap notch definition (Fig.1).
3.	"	"	"	45.75MC	"	"	A3, A4	Adjust A3 to place 45.75MC marker at 60% on high side of response curve. Simultaneously adjust A4 for flat top and symmetrical response similar to Fig. 1.
4.	"	"	"	42.25MC	"	"	A5	Adjust to place 42.25MC marker at 50% on response curve. Simultaneously retouch A4 to obtain response similar to Fig. 1.
5.	"	High side to point Ⓓ. Low side to chassis. Use very short leads.	"	41.25MC 42.25MC 45.25MC 47.25MC	"	"	A6, A7	Simultaneously adjust A6 and A7 for response similar to Fig. 2. A6 positions curve and A7 has leveling effect. To check the 41.25MC and 47.25MC trap attenuation connection the DC probe of VTVM to point Ⓒ. Common to chassis. Take readings with marker generator set to 41.25MC, 44.0MC and 47.25MC. The voltage ratio between 41.25MC and 44.0MC should be between 30 and 65 and the voltage ratio between 47.25MC and 44.0MC should be between 100 and 200.

REGENERATION CHECK

Leave pin 9 of V2 shorted to chassis but remove 6 volt bias supply. With generator and scope connect as in step 5, observe response curve. Any regeneration will be indicated by sharp peaks on the response curve.

IF SENSITIVITY MEASUREMENT

Connect the high side of an AM signal generator to point Ⓑ. Low side to chassis. Set signal generator to 44.0MC.
Connect the DC probe of VTVM to point Ⓒ. Common to chassis.
A signal of less than 750 microvolts from the generator should produce one volt on VTVM.

MIXER SENSITIVITY MEASUREMENTS

Connect the high side of an AM signal generator thru .001MFD capacitor to point Ⓓ. Low side to chassis.
Set signal generator to 44.0MC. Short out R16 4.7K.
Switch channel selector to UHF (channel 1) position. A signal of less than 100 microvolts from the generator should produce one volt at VTVM.

RF AND MIXER ALIGNMENT

Preset A8 and A9 fully into coil. Preset A10 midway into coil. Remove tuner shield.
Connect the synchronized sweep voltage from the sweep generator to the horizontal input of the oscilloscope for horizontal deflection.
The sweep generator output lead should be terminated. with its characteristic impedance, usually 50 ohms.

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
6.	Two 120Ω Carbon Resistors	Across antenna terminals with 120Ω in each lead.	177MC (20MC Swp)	175.25MC 179.75MC	7	Vert. thru 47KΩ to point Ⓓ. Low side to chassis.	A11, A8	Adjust A-11 so that sound and video marker fall within limits shown in Fig. 3. Adjust A8 until side of channel 7 is affected, then back off A8 so it just stops affecting channel 7. NOTE: If core is turned in too far, it will affect channel 6 setting.
7.	"	"	213MC (20MC Swp)	211.25MC 215.75MC	13	"	A10	Adjust for response curve similar to Fig. 3. Be sure markers fall within limits shown. Recheck channel 7. If necessary, retouch A-11. Make no further adjustment of A8 at present.
8.	"	"	207MC (20MC Swp)	205.25MC 209.75MC	12	"		Check for response curve similar to Fig. 3. (If response is checked with tuner shield cover in place the video marker will move up the curve a short distance, but markers should be within tolerance.)
			201MC (20MC Swp)	199.25MC 203.75MC	11			
			195MC (20MC Swp)	193.25MC 197.75MC	10			
			189MC (20MC Swp)	187.25MC 191.75MC	9			
			185MC (20MC Swp)	181.25MC 185.75MC	8			
			177MC (20MC Swp)	175.25MC 179.75MC	7			
9.	"	"	85MC (20MC Swp)	83.25MC 87.75MC	6	"	A12, A17	Adjust A12 by compressing or expanding coil turns to obtain response similar to Fig.4 withmarkers not falling below 60%. Usually the antenna coils A17 thru A21 are not to be adjusted. If the antenna coils have been distored, they may be adjusted by compressing or expanding coil turns for maximum response in conjunction with the RF coils (A12 thru A16). If it is necessary to adjust any antenna coil in following steps, then the UHF coil adjustment of A8 must be repeated as in step 6.
10.	"	"	"	83.25MC 87.75MC	"	"	A9	Adjust FM trap core, A9 until a slight effect is noted on sound side of response curve (Fig.4).

ALIGNMENT INSTRUCTIONS (cont)

RF AND MIXER ALIGNMENT CONTINUED

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
11.	Two 120Ω Carbon Resistors	Across antenna terminals with 120Ω in each lead.	79MC (20MC Swp)	77.25MC 81.75MC	5	Vert. Amp. thru 47KΩ to point Ⓓ. Low side to chassis.	A13, A18	Adjust A13 by compressing or expanding coil turns for response similar to Fig. 4. For A18 see remarks step 9.
12.	"	"	69MC (20MC Swp)	67.25MC 71.75MC	4	"	A14, A19	Adjust A14 for response similar to Fig. 4. For A19 see remarks step 6.
13.	"	"	63MC (20MC Swp)	61.25MC 65.75MC	3	"	A15, A20	Adjust for response similar to Fig. 4. For A20 see remarks step 9.
14.	Two 120Ω Carbon Resistors	Across antenna terminals with 120Ω in each lead.	57MC (20MC Swp)	55.25MC 59.75MC	2	Vert. Amp. thru 47KΩ to point Ⓓ. Low side to chassis.	A16, A21	Adjust for response similar to Fig. 4. For A21 see remarks in step 9. Replace tuner shield and recheck channels 13 thru 2. Response on channels 6 thru 2 must be similar to Fig. 4 with markers not falling below 60% on response curve.
15.	Direct	High side to point Ⓔ. Low side to chassis.	44MC (20MC Swp)	42.25MC 46.75MC	UHF (Chan. 1)	"	A22	Remove tuner shield. Adjust A22 by compressing or expanding coil for response curve similar to Fig. 4. Replace tuner shield.

OSCILLATOR ALIGNMENT

Remove shorting jumper from pin 9 of V2 to chassis. Replace the 6 volt bias supply as under "Video IF Alignment".
Use only enough sweep output from generator to produce usable pattern on scope. Connect the synchronized sweep voltage from the sweep generator to the horizontal input of the oscilloscilloscope for horizontal deflection.
The sweep generator output lead should be terminated with its characteristic impedance, usaully 50 ohms.
Set the fine tuning control to the mid-position range.

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
16.	Two 120Ω Carbon Resistors	Across antenna terminals with 120Ω in each lead.	195MC (10MC Swp)	193.25MC 197.75MC	10	Vert. Amp. thru 47KΩ to point Ⓒ. Low side to chassis.	A23	Adjust to place sound marker SLIGHTLY higher than the sound trap notch. This allowance must be made due to the removal of tuner shield. With shield replaced, the sound marker should move down into the trap notch. Check channels 7 thru 13 noting if sound marker for each channel falls just above the trap notch. Response should be similar to Fig. 5. If more than a 30 degree rotation of fine tuning controls is necessary to place sound marker in proper position on any high band channel adjust A24. If A24 is adjusted it may be necessary to readjust A23 on channel 10.
			213MC (10MC Swp)	211.25MC 215.75MC	13			
			207MC (10MC Swp)	205.25MC 209.75MC	12			
			201MC (10MC Swp)	199.25MC 203.75MC	11			
			189MC (10MC Swp)	187.25MC 191.75MC	9			
			183MC (10MC Swp)	181.25MC 185.75MC	8			
			177MC (10MC Swp)	175.25MC 179.75MC	7			
17.	"	"	85MC (10MC Swp)	83.25MC 87.75MC	6	"	A25	Check to see that fine tuning is at mid-capacity. Adjust A25 by compressing or expanding coil to place sound marker just above trap notch as in Fig. 5.
18.	"	"	79MC (10MC Swp)	77.25MC 81.75MC	5	"	A26	Adjust by compressing or expanding coil to place sound marker just above trap notch (Fig. 5) with fine tuning control set within 15 degrees of mid-position.
			69MC (10MC Swp)	67.25MC 71.75MC	4		A27	
			63MC (10MC Swp)	61.25MC 65.75MC	3		A28	
			57MC (10MC Swp)	55.25MC 59.75MC	2		A29	

UHF TUNER ALIGNMENT

This portion of the receiver has been properly aligned at the factory and is very stable. Alignment of this portion of the receiver should not be required in the field.

CHANNEL 7 INTO 6 INTERFERENCE TRAP AND IF ALIGNMENT

Instructions are the same as for "Oscillator Alignment".

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
19.	Two 120Ω Carbon Resistors	Across antenna terminals with 120Ω in each lead.	85MC (10MC Swp)	83.25MC 87.75MC	6	Vert. Amp. thru 47KΩ to point Ⓒ. Low side to chassis.	A30	This is channel 7 into 6 trap adjustment. Set fine tuning so that sound marker falls into trap notch. Increase sweep generator output to produce visible response on scope. Adjust A30 for MINIMUM response.
20.	"	"	44MC (10MC Swp)	41.25MC 44.50MC 45.75MC	2	"	A31	Increase sweep generator output to produce visible response on scope. Adjust A31 for MINIMUM response similar to Fig. 6.

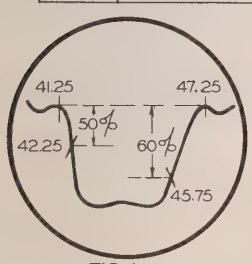


FIG. 1

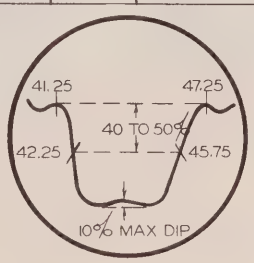


FIG. 2

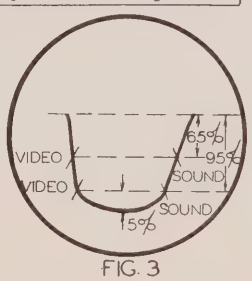


FIG. 3

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ALIGNMENT INSTRUCTIONS (cont)

SOUND IF ALIGNMENT USING AM SIGNAL GENERATOR AND VTVM

Connect two matched 100KΩ (±1%) resistors in series from point Ⓕ to chassis. The junction of these two resistors is alignment point Ⓖ as shown on the schematic.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	CHANNEL	CONNECT VTVM	ADJUST	REMARKS
21.	Direct	High side to point Ⓒ. Low side to chassis.	4.5MC (Unmod)	Any non-interfering channel	DC probe thru 10KΩ to point Ⓕ. Common to chassis.	A32, A33, A34	Adjust for maximum deflection.
22.	"	"	"	"	DC probe to point Ⓗ. Common to point Ⓖ.	A35	Adjust for zero reading. A positive and negative reading will be obtained on either side of the correct setting. Check steps 21 and 22 for best accuracy.

SOUND IF ALIGNMENT USING FM SIGNAL GENERATOR AND OSCILLOSCOPE

Use frequency modulated signal with 60∿ modulation and 450KC sweep. Use 120∿ sawtooth voltage in scope for horizontal deflection.

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
21.	Direct	High side to point Ⓒ. Low side to chassis.	4.5MC (450KC Swp)	4.5MC	Any non-interfering channel	Vert. Amp. thru 10KΩ to point Ⓕ. Low side to chassis.	A32, A33, A34	Disconnect stabilizing capacitor C4B. Adjust for curve of maximum amplitude and symmetry similar to Fig. 7.
22.	"	"	"	"	"	Vert. Amp. to point Ⓗ. Low side to chassis.	A35	Reconnect stabilizing capacitor C4B. Adjust so that 4.5MC occurs at center of crossover lines as in Fig. 8. SLIGHTLY retouch A34 for maximum amplitude and straightness of crossover lines.

SOUND IF ALIGNMENT USING TV SIGNAL AND VTVM

This method provides an accurate signal source. Tune in a TV station. See steps 21 and 22 of "Sound IF Alignment Using AM Signal Generator and VTVM" for VTVM connections and for adjustment of A32 for sharp alignment, turn fine tuning slightly off station so that VTVM reads 6 to 8 volts from point Ⓕ to chassis.

4.5MC TRAP ALIGNMENT

Set contrast control fully clockwise.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	CHANNEL	CONNECT VTVM	ADJUST	REMARKS
23.	Direct	High side to point Ⓒ. Low side to chassis.	4.5MC (Unmod)	Any non-interfering channel	DC probe thru detector Fig. 9 to pin 11 (cathode) of picture tube.	A36	Adjust for MINIMUM deflection. Remove 2500Ω, 10 watt resistor from 240 volt buss. Replace V16 in its socket.

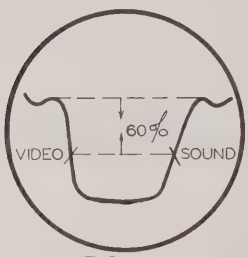


FIG. 4

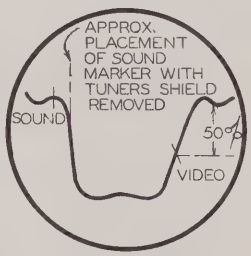


FIG. 5

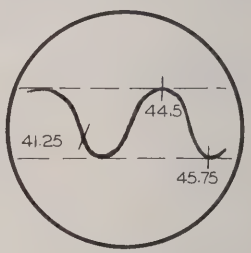


FIG. 6

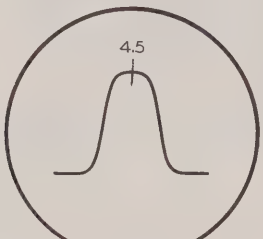


FIG. 7

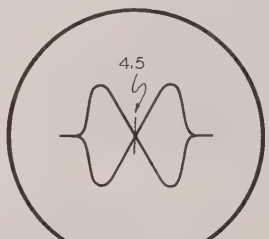


FIG. 8

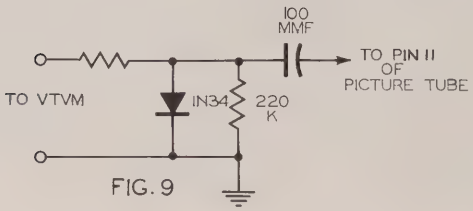
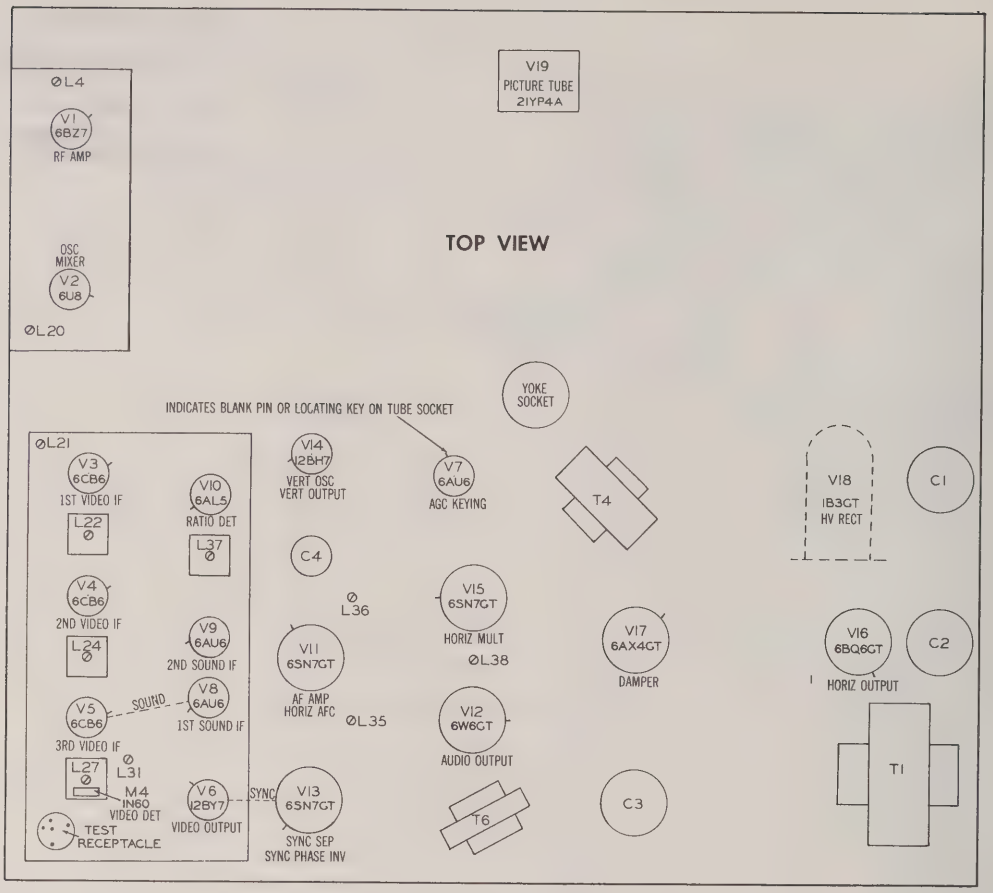


FIG. 9

TUBE PLACEMENT CHART



TUBE FAILURE CHECK CHART

The following chart lists tubes whose failures are most likely to produce the indicated symptoms. Refer to tube placement chart for location and type of tube.

POWER SUPPLY FAILURE
No raster, no sound - **V12,Selenium Rectifiers (M1 and M2) Fuse (M3)**

LOSS OF PICTURE OR SOUND
No pic, no sound, has raster - **V2, V3, V4, V5, V12**
No pic, no sound, has snow - **V1, V2, V3**
No pic, has sound, has raster - **V6, V7, V19**
Has pic, no sound - **V8, V9, V10, V11, V12**
Overloaded picture - **V7**

SYNC FAILURE
No vert. sync - **V13, V14**
No horiz. sync - **V11, V13, V15**
No vert. or horiz. sync - **V13**

SWEEP FAILURE
No raster, has sound - **V15, V16, V17, V18, V19**
No vertical deflection - **V14**
Poor vert. linearity or foldover - **V14**
Poor horiz. linearity or foldover - **V15, V16, V17**
Narrow picture - **V15, V16, V17, V18, M1, M2**
Vert. off freq. - **V13, V14**
Horiz. off freq. - **V11, V13, V15**

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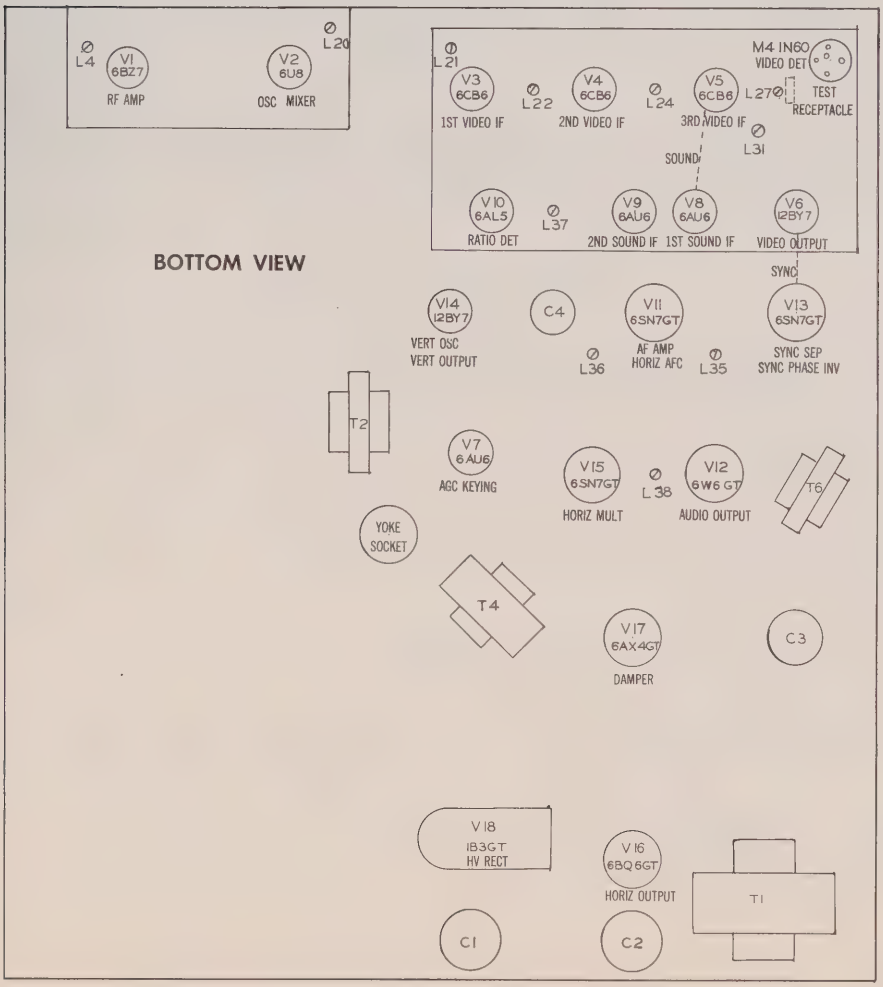
RESISTANCE MEASUREMENTS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8	Pin 9
V 1	6BZ7	INF	700KΩ	0Ω	0Ω	.1Ω	†4KΩ	INF	INF	0Ω
V 2	6U8	■2KΩ	900KΩ	■330KΩ	.1Ω	0Ω	■16KΩ	0Ω	0Ω	15KΩ
V 3	6CB6	270KΩ	47Ω	0Ω	.1Ω	†3.5KΩ	†3.5KΩ	0Ω		
V 4	6CB6	270KΩ	47Ω	.1Ω	0Ω	†3.5KΩ	†3.5KΩ	0Ω		
V 5	6CB6	3Ω	120Ω	.1Ω	0Ω	■1KΩ	■1KΩ	0Ω		
V 6	12BY7	70Ω	4.7KΩ	70Ω	0Ω	0Ω	.1Ω	■5KΩ	■500Ω	70Ω
V 7	6AU6	■40KΩ	■0Ω	0Ω	.1Ω	250KΩ	†85Ω	■0Ω		
V 8	6AU6	2.2Ω	0Ω	0Ω	.1Ω	■10KΩ	■10KΩ			
V 9	6AU6	60KΩ	60KΩ	0Ω	.1Ω	†2.3KΩ	†2.3KΩ	60KΩ		
V 10	6AL5	INF	INF	0Ω	.1Ω	15KΩ	0Ω	0Ω		
V 11	6SN7GT	300KΩ	22KΩ	100KΩ	200KΩ	†33KΩ	1.5KΩ	0Ω	.4Ω	
V 12	6W6GT	470KΩ	0Ω	†300Ω	†85Ω	†33KΩ	470KΩ	.1Ω	60KΩ	
V 13	6SN7GT	1.8Meg	■1.2Meg	70Ω	22KΩ	■10KΩ	2.2KΩ	.1Ω	0Ω	
V 14	12BH7	▲900Ω	▲3Meg	10KΩ	.1Ω	.1Ω	▲3Meg	650KΩ	50Ω	0Ω
V 15	6SN7GT	5Meg	†10KΩ	1KΩ	140KΩ	†70KΩ	1KΩ	.1Ω	0Ω	
V 16	6BQ6GT	†70KΩ	.1Ω	■0Ω	■680Ω	330KΩ	330KΩ	0Ω	0Ω	Top Cap ▲33Ω
V 17	6AX4GT	▲330KΩ	▲24Ω	1.7Meg	INF	†85Ω	†85Ω	.1Ω	0Ω	
V 18	1B3GT	PINS 1 - 8 HAVE INFINITE RESISTANCE								Top Cap ▲270Ω
V 19	21YP4A	.1Ω	470KΩ	Pin 6 ▲17Ω	Pin 10 ▲17Ω	Pin 11 ■110KΩ	Pin 12 0Ω			

† MEASURED FROM OUTPUT OF M1.
■ MEASURED FROM 140V LINE.
▲ MEASURED FROM PIN 3 OF V17.



TUBE PLACEMENT CHART

SET 272 FOLDER 8

TROUBLE SHOOTING AIDS

SWEEP

HORIZONTAL

LOSS OF SWEEP

Follow procedure outlined under "Loss of High Voltage".

INSUFFICIENT SWEEP

Check by substitution V16 and V17. Check M1 and M2. Check T3, T5A, R90, R87, C96, C94, C95 and other associated components.

DRIVE LINES

Check by substitution V16 and V17. Check C96, C94, R87, T3 and other associated components.

DRIVE LINES

Check by substitution V16 and V17. Check C96, C94, R87, T3 and other associated components.

COMPRESSED LEFT SIDE

Check by substitution V16 and V17. Check horizontal output and damper stages for component failure or change of value.

FOLDS

Follow procedure outlined under "Drive Lines".

PIE CRUST EFFECT

Check by substitution V15, V16 and V17. Check C90 for open. Check L38, C92, C89 and other associated components.

XMAS TREE EFFECT

Check by substitution V15, V16 and V17. Check T3 and T5A for internal arcing. Check L38, C92, C88, C86, C85 and other associated components.

VERTICAL

LOSS OF SWEEP

Substitute V14. Check waveform W9.

If Satisfactory	If Unsatisfactory
Check T4, T5B, R6, R73 and other associated components.	Check T2, R7, and other associated components.

INSUFFICIENT SWEEP

Substitute V14. Check R7, R6, R73, T4 and other associated components.

COMPRESSED AT BOTTOM

Substitute V14. Check C5, C80, C81, R7 and other associated components.

COMPRESSED AT TOP

Substitute V14. Check R6, R73, C5, C2C, T4 and other associated components.

HOLDS

Substitute V14. Check R73, C5, C80, C81 and other associated components.

SYNC

LOSS OF VERTICAL AND HORIZONTAL SYNC

Substitute V13. Check C72, C74, C75, R68, R69, R64 and other associated components.

LOSS OF VERTICAL SYNC - HORIZONTAL SYNC SATISFACTORY

Substitute V14. Check C76, C78, C79, T2, R5 and other associated components.

LOSS OF HORIZONTAL SYNC - VERTICAL SYNC SATISFACTORY

Check by substitution V11 and V15. Check C83, C84, C89, C92, L38, R83 and other associated components.

HORIZONTAL BENDING

Check by substitution V11, V12, V13, and V15. Check horizontal AFC network.

VIDEO

LOSS OF VIDEO

Substitute V6. Check R39, R42, C48, C4A, C50, L33, L32, L34 and other associated components.

SOUND BARS (4.5MC BEAT)

Adjust tuner fine tuning for best sound and picture. Check adjustment A36. Check video IF alignment.

POOR CONTRAST

Substitute V6. Check L32, L33, L34, C50, C51, C48, R39, R42 and other associated components.

NEGATIVE PICTURE

Substitute V6. Check picture tube. Check video crystal network. Check L28, L29, L30, C50 and other associated components.

SMEAR

Substitute V6. Check L28, L29, L30, L32, L33, L34, C50 and other associated components.

WIDE BLACK BAR ACROSS PICTURE

Check by substitution V1, V3, V4, V5 and V6 for heater to cathode leakage.

AUDIO

WEAK OR NO SOUND

Check by substitution V8, V9, V10, V11 and V12. Check stages V11 and V12 using audio signal generator. Apply audio signal across R2B.

If Satisfactory	If Unsatisfactory
Check ratio detector and audio IF stages for component failure or change of value.	Check C65, C67, C4C, R58, T6, speaker and other associated components.

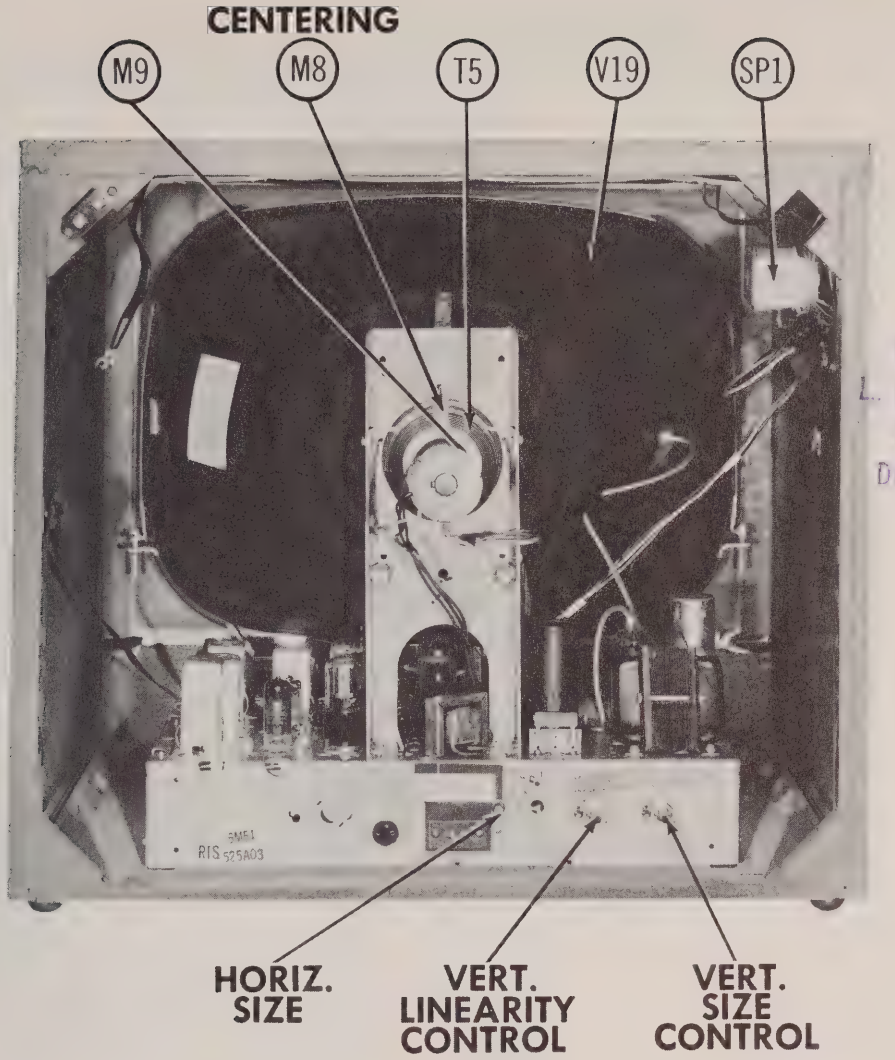
BUZZ

Adjust tuner fine tuning for best sound and picture. Check adjustment A35. If still unsatisfactory, check audio IF alignment.

DISTORTED

Follow procedure outlined under "Weak or No Sound".

CON'T ON PAGE 21



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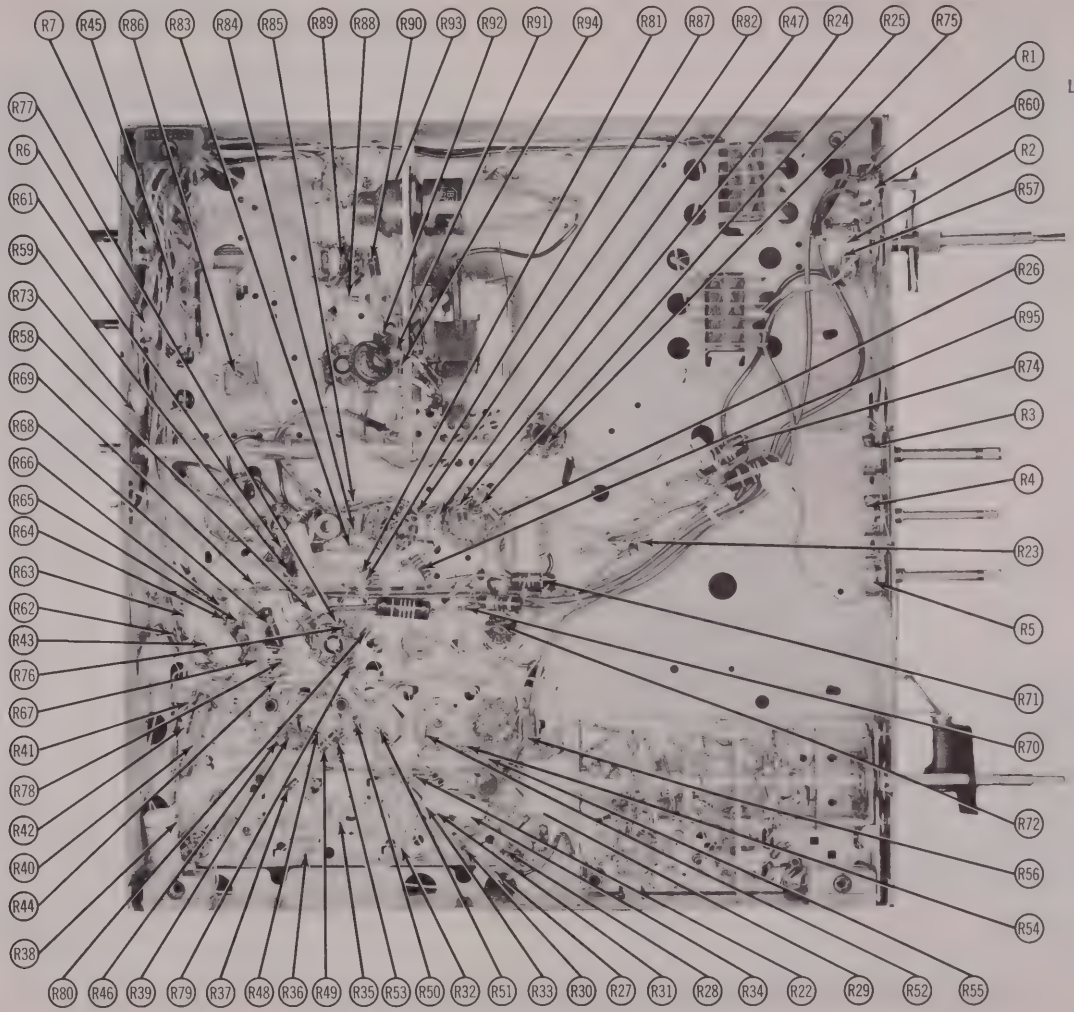
CABINET—REAR VIEW

HORIZONTAL SWEEP CIRCUIT ADJUSTMENTS

Turn set on and tune in a TV station, preferably a test pattern.

Normally the horizontal hold control will have a sync range of approximately 30 degrees. If the controls are too critical, adjust as follows.

1. Shunt the horiz. oscillator coil (L38) to ground with a . 25MFD 400 volt capacitor. This may be done with the chassis in cabinet by placing the capacitor across the two pin sockets on rear of chassis labeled "Test Receptacle Only".
2. With the horizontal centering lever, move the picture to the right so the left edge of raster may be seen. Adjust the horiz. hold control until no blanking pulse appears and the picture just starts to fold on the left. The blanking pulse is the gray bar just to the left edge of the raster. It may be necessary to adjust the contrast and brightness control to make this gray bar pulse visible.
3. Remove the . 25MFD capacitor across L38.
4. Adjust the horiz. osc. coil slug (B1) until no sync pulse can be seen as in step 2 and recenter picture. Adjust the horizontal size adjustment (B2) located on rear of chassis slightly wider than necessary to fill picture mask horizontally. Since this adjustment affects the vertical size, it may be necessary to adjust the vertical size control at the same time.



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CHASSIS BOTTOM VIEW-RESISTOR IDENTIFICATION

PARTS LIST AND DESCRIPTIONS

TUBES (SYLVANIA, GENERAL ELECTRIC, WESTINGHOUSE)

ITEM No.	USE	REPLACEMENT DATA		RETMA BASE TYPE	NOTES
		MOTOROLA PART No.	STANDARD REPLACEMENT		
V1	RF Amp.	6BZ7	6BZ7	9AJ	
V2	Mixer-Osc.	6U8	6U8	9AE	
V3	1st Video IF Amp.	6CB6	6CB6	7CM	
V4	2nd Video IF Amp.	6CB6	6CB6	7CM	
V5	3rd Video IF Amp.	6CB6	6CB6	7CM	
V6	Video Output	12BY7	12BY7	9BF	
V7	AGC Keying	6AU6	6AU6	7BK	
V8	1st Sound IF Amp.	6AU6	6AU6	7BK	
V9	2nd Sound IF Amp.	6AU6	6AU6	7BK	
V10	Ratio Det.	6AL5	6AL5	6BT	
V11	AF Amp. - Horiz. AFC	6SN7GT	6SN7GT	8BD	
V12	Audio Output	6W6GT	6W6GT	7S	
V13	Sync Sep. - Sync Phase Inv.	6SN7GT	6SN7GT	8BD	
V14	Vert. Osc. - Vert. Output	12BH7	12BH7	9A	
V15	Horiz. Mult.	6SN7GT	6SN7GT	8BD	
V16	Horiz. Output	6BQ6GT	6BQ6GT	6AM	
V17	Damper	6AX4GT	6AX4GT	4CG	
V18	HV Rectifier	1B3GT	1B3GT	3C	

PROPERTY OF
L. F. BLANKENSHIP
3924 MEADE ST.
DENVER, COLORADO

CATHODE-RAY TUBE

ITEM No.	REPLACEMENT DATA					RETMA BASE TYPE	NOTES
	MOTOROLA PART No.	CBS-HYTRON PART No.	GENERAL ELECTRIC PART No.	SYLVANIA PART No.	WESTINGHOUSE PART No.		
V19	21YP4A ①	21YP4A ① 21YP4	21YP4A ① 21YP4	21YP4A ① 21YP4 21AFP4 ②	21YP4A ① 21YP4	12L 12L 12M	① Aluminized ② Circuit charges necessary

CAPACITORS

Capacity values given in the rating column are in mfd. for Electrolytic and Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING		REPLACEMENT DATA						NOTES
	CAP.	VOLT	MOTOROLA PART No.	CENTRALAB PART No.	ERIE PART No.	MALLORY PART No.	PYRAMID PART No.	SANGAMO PART No.	
C1	140	150	23B484097			FP117	TM-140-150	T-050	
C2A	▲200	150	23B733495			FP312.5			Note 3
B	■140	150				TC48			
C	▲60	150							
C3A	▲200	150	23B710941			FP216.1	TM-200-150	PL-15200	
B	▲5	150					TD-4-150	FM-1504	
C4A	■30	150	23B733494			FP333.6	TM-302010-250	T-080	
B	▲10	50							
C	10	50							
C5	10	450	23A702450			TC72	TD-10-450	FM-4510	Note 4
C6	22		21R120539						
C7	22		21R120539						
C8	6.8		21R120561						
C9	1-6		20K731175	829-6		CT552			
C10	4		21R115953						
C11	470		21R115856	D6-471	GP1K-471	UC-5347			
C12	220		21R410115	D6-221	GP1K-221	UC-5322			
C13	10000		21R482726	DD-103	811-01	DC-511			
C14	2.2		21R115948	TCZ-2.2	NP0K-2R2				
C15	10		21R121837						
C16	1000		21R115386	DD-102	801-001	DC-521			
C17	470		21R121478	DD-471	801-00047	UC-5347			
C18	.5-3		21K710943	829-3	3139-01-0R5	CT565A			
C19	1500		21R120100	DD-152	801-0015	DC-5215			
C20	1500		21R120100	DD-152	801-0015	DC-5215			
C21A	1500		21R121406	DD2-152	812-0015	DCD-5215			
B	1500								
C22	12		21R121110						
C23	.5-3		21K710943	829-3	3139-01-0R5	CT565A			
C24	22		21R119049						
C25	1.0		21R114071						
C26	1500		21R120100	DD-152	801-0015	DC-5215			
C27	10000		21R482726	DD-103	811-01	DC-511			
C28	10000		21R482726	DD-103	811-01	DC-511			
C29A	800		21R400943	DD2-102	812-001	DCD-521			
B	800								
C30	470		21R121478	DD-471	801-00047	UC-5347			
C31	1500		21R120100	DD-152	801-0015	DC-5215			
C32	1500		21R120100	DD-152	801-0015	DC-5215			
C33	1500		21R120100	DD-152	801-0015	DC-5215			
C34	100		21R410036	TCN-100	N750K-101	NT-531			
C35	470		21R114554	DD-471	801-00047	UC-5347			
C36	.25	100	8R121575			PT4025	IMP2-P25	3302025	
C37	.25	100	8R121575			PT4025	IMP2-P25	3302025	
C38	560		21R120936	D6-561	GP2K-561	UC-5356			
C39	470		21R114554	DD-471	801-00047	UC-5347			
C40	1000		21R115386	DD-102	801-001	DC-521			
C41	560		21R120936	D6-561	GP2K-561	UC-5356			
C42	1000		21R115386	DD-102	801-001	DC-521			Note 1
C43	470		21R114554	DD-471	801-00047	UC-5347			
C44	1000		21R115386	DD-102	801-001	DC-521			
C45	470		21R114554	DD-471	801-00047	UC-5347			
C46	470		21R114554	DD-471	801-00047	UC-5347			
C47	470		21R114554	DD-471	801-00047	UC-5347			
C48	5000		21R115312	DD-502	801-005	DC-525			
C49	30		21R410048						
C50	.1	200	8K120875	DF-104		PT401	IMP2-P1	330201	
C51	5000		21R115312	DD-502	801-005	DC-525			
C52	1500	2000	21R121863	DD30-152					
C53	2.2		21R115949	TCZ-2.2	NP0K-2R2				
C54	18		21R120578						
C55	10000		21R482726	DD-103	811-01	DC-511			
C56	10000		21R482726	DD-103	811-01	DC-511			
C57	1500		21R120100	DD-152	801-0015	DC-5215			
C58	10000		21R482726	DD-103	811-01	DC-511			
C59	10000		21R482726	DD-103	811-01	DC-511			
C60	10000		21R482726	DD-103	811-01	DC-511			

PROPERTY OF
L. F. BLANKENSHIP
3924 MEADE ST.
DENVER, COLORADO

PARTS LIST AND DESCRIPTIONS (Continued)

CAPACITORS (cont)

ITEM No.	RATING CAP.	RATING VOLT	MOTOROLA PART No.	CENTRALAB PART No.	ERIE PART No.	MALLORY PART No.	PYRAMID PART No.	SANGAMO PART No.	NOTES
C61	1000		21AI31678	DD-102	801-001	DC-521			
C62	5000		21RU1312	DD-502	801-005	DC-525			
C63	1000		21AI31678	DD-102	801-001	DC-521			
C64	1500		21RU20100	DD-5215	801-0015	DC-5215			
C65	5000		21RU1312	DD-525	801-005	DC-535	1MP4-D5	C-1250	
C66	5300			DD-5233	801-0053	DC-5233	1MP6-D33	C-1233	
C67	5000		21RU1312	DD-525	801-005	DC-525		C-1205	
C68	.005	1000				PT1625	CT10-D5	315-.005	
C69	.05	600	5RU1566			PT812	1MP6-S3	330613	
C70	10000		21R4182726	DD-103	81-01	DC-51			
C71	10000		21R4182728	DD-103	81-01	DC-51			
C72	4700			DD-502	801-005	DC-525		C-1247	
C73	47		21RU15593	TCN-47	N750K-470	DT-5447		KR-1447	
C74	220		21RU15905	D6-221	GPIK-221	UC-5322		K-1322	
C75	.05	200	5RU21567	DF-503		PT415	1MP2-S5	330215	
C76	.0047	400	5K490222	D6-502	GP2-333-502	PT425	1MP6-D47	3306247	
C77	.0047	400	5K490222	D6-502	GP2-333-502	PT425	1MP6-D47	3306247	
C78	.01	400	5K490236	D6-103	GP2-333-103	PT431	1MP4-S1	330411	
C79	4700			DD-502	801-005	DC-525		C-1247	
C80	.047	400	21RU21567	DF-503		PT415	1MP4-S47	330447	
C81	.047	400	21RU21567	DF-503		PT415	1MP4-S47	330447	
C82	5000	2000	21RU20093	DD30-502					
C83	470		21RU15856	D6-471	GP2L-471	UC-5347		K-1347	
C84	470		21RU15856	D6-471	GP2L-471	UC-5347		K-1347	
C85	470		21RU15856	D6-471	GP2L-471	UC-5347		K-1347	
C86	1000		21RU14740	D6-102	GP2L-103	DC-108	1MP6-D1	K-1310	
C87	.003	600	5RU21569	D6-302	GP2-333-303	PT623	1MP3-D3	330623	
C88	.001	1000	5K490265	D6-102		PT1561	CT10-D1	315-.001	
C89	.003	600	5RU21569	D6-302	GP2-333-303	PT623	1MP3-D3	330623	
C90	.01	400	5RU21002	D6-103	GP2-333-103	PT431	1MP4-S1	330411	
C91	100		21RU15900	D6-101	GPIK-101	UC-531		K-1310	
C92	.0047	400	5K490232	D6-502	GP2-333-503	PT425	1MP6-D47	3306247	
C93	390	500	21RU14740			MCB243		KR-1339	
C94	390	500	21RU14740			MCB243		KR-1339	
C95	.039	400	5K490231						
C96	5000		21RU15313	DD-501	801-005	DC-535	1MP6-D5	C-1350	
C97	100	3000	21RU31624	DD30-101					
C98	51	1000	21RU20934						Note 3

Note 1: Some versions may use a 470MMF in this application.
Note 2: Chassis WTS-525 uses a 75MMF in this application.
Note 3: Chassis WTS-525 may use a 60MMF/3000V, 160MMF/1500V or 200MMF/150V in this application.
Note 4: Chassis WTS-525 may use a 10MMF/500V in this application.

CONTROLS

ITEM No	RATING RESISTANCE	RATING WATTS	MOTOROLA PART No.	IRC PART No.	CLAROSTAT PART No.	CENTRALAB PART No.	MALLORY PART No.	INSTALLATION NOTES
R1A	1Meg	½	18A73087	QII-157	A47-1Meg-S	AB-59	U-54	Accoustimor
B	Shaft		Not Req.	Not Req.	KS8-3	AK-4	Not Req.	Attach to R1A
R2A	350Ω	½	18D732314		RTV-498		UE-25	Contrast - Panel
B	1Meg	½						Volume & Switch tapped at 250KΩ - Rear
R3A	5Meg	½	18D734143	QII-141	A47-5Meg-S	AB-57	U-57	Brightness
B	Shaft		Not Req.	Not Req.	KS8-3	AK-4	Not Req.	Attach to R3A
R4A	250KΩ with 50KΩ stop	½	18K734246	QII-139	A47-250K-S	AB-46	U-46	Horiz. Hold - Note 1
B	Shaft		Not Req.	Not Req.	KS8-3	AK-4	Not Req.	Attach to R4A
R5A	450KΩ with 400KΩ stop	½	18D734143	QII-153	A47-500K-S	AB-59	U-59	Vert. Hold - Note 2
B	Shaft		Not Req.	Not Req.	KS8-3	AK-4	Not Req.	Attach to R5A
R6A	750Ω	½	18K735454	QII-105	A47-750-S	AB-415	U-4	Vert. Linearity
B	Shaft		Not Req.	TQ	FK3-1/4	AK-4	Not Req.	Attach to R6A
R7A	7Meg with 2Meg stop	½	18D733413	QII-141	A47-7.5Meg-S	AB-58	U-58	Vert. Size- Note 3
B	Shaft		Not Req.	TQ	FK3-1/4	AK-4	Not Req.	Attach to R7A

Note 1: Connect a 47KΩ resistor in series with the right hand terminal of the control and the lead connecting to the same terminal of the original control. (Control viewed from shaft end terminals down.)
Note 2: Connect a 350KΩ resistor in series with the right hand terminal of the control and the lead connecting to the same terminal of the original control. (Control viewed from shaft end, terminals down.)
Note 3: Connect a 2Meg resistor in series with the right hand terminal of the control and the lead connecting to the same terminal of the original control. (Control viewed from shaft end, terminals down.)

RESISTORS

ITEM No.	RATING OHMS	RATING WATT	MOTOROLA PART No	IRC PART No.	NOTES
R8	1Meg	½	6RH004	BTS-1Meg	
R9	47KΩ	½	6RH016	BTS-47K	
R10	22KΩ	½	6RH297	BTS-22K	
R11	10KΩ	½	6RH054	BTS-10K	
R12	470Ω	½	6RH090	BTS-470	
R13	1000Ω	½	6RH301	BTS-1000	
R14	15KΩ	½	6RH319	BTS-15K	
R15	1000Ω	½	6RH301	BTS-1000	
R16	4700Ω	½	6RH039	BTS-4700	
R17	330KΩ	½	6RH014	BTS-330K	
R18	330KΩ	½	6RH014	BTS-330K	
R19	4700Ω	½	6RH039	BTS-4700	
R20	10KΩ	½	6RH054	BTS-10K	
R21	1000Ω	½	6RH301	BTS-1000	
R22	2700Ω	1	6RH305	BTA-2700	
R23	2.7Meg 5%	½	6RH48185	BTS-2.7Meg 5%	
R24	470KΩ 5%	½	6RH00205	BTA-470K 5%	
R25	820KΩ	½	6RH058	BTA-820K	
R26	330KΩ	½	6RH096	BTS-330K	

ITEM No.	RATING OHMS	RATING WATT	MOTOROLA PART No	IRC PART No.	NOTES
R27	1000Ω	½	6RH301	BTS-1000	
R28	18KΩ	½	6RH291	BTS-18K	
R29	47Ω	½	6RH550	BTS-47	
R30	1000Ω	½	6RH301	BTS-1000	
R31	33KΩ	½	6RH410	BTS-33K	
R32	47Ω	½	6RH550	BTS-47	
R33	220Ω	½	6RH303	BTS-220	
R34	30000Ω	5	17K733878		
R35	33KΩ	½	6RH410	BTS-33K	
R36	1200Ω 5%	½	6RH551	BTS-150 5%	
R37	1000Ω	½	6RH301	BTS-1000	
R38	4700Ω	2	6RH080	BTS-4700	
R39	470Ω	3	6RH565	BTS-470	
R40	9000Ω	5	17K121123	1 3/4A-9000	
R41	10KΩ	½	6RH321	BTS-10K	
R42	22KΩ	2	6RH098	BTS-22K	
R43	100KΩ	½	6RH031	BTS-100K	
R44	1Meg	½	6RH046	BTS-1Meg	
R45	470KΩ	½	6RH577	BTS-470K	
R46	33KΩ	½	6RH410	BTS-33K	

PARTS LIST AND DESCRIPTIONS (Continued)

RESISTORS (cont)

ITEM No.	RATING OHMS	RATING WATT	MOTOROLA PART No.	IRC PART No.	NOTES
R47	330KΩ	½	6RH571	BTA-330K	
R48	150Ω	½	6RH992	BTS-150	
R49	10KΩ	½	6RH430	BTA-10K	
R50	15KΩ	½	6RH477	BTS-15K	
R51	1500Ω	½	6RH992	BTS 150	
R52	2200Ω	½	6RH290	BTS-2200	
R53	2200Ω	½	6RH290	BTS-2200	
R54	120Ω	½	6RH550	BTS-120	
R55	33KΩ	½	6RH410	BTS-33K	
R56	15KΩ	½	6RH319	BTS-15K	
R57	68KΩ	½	6RH001	BTS-68K	
R58	15000Ω 5%	½	6RH00459	BTS-1500 5%	
R59	33KΩ 5%	½	6RH758	BTA-33K 5%	
R60	47KΩ	½	6RH048	BTS-47K	
R61	470KΩ	½	6RH577	BTA-470K	
R62	270KΩ	½	6RH414	BTS-270K	
R63	1.5Meg	½	6RH553	BTS-1.5Meg	Note 1
R64	1.2Meg	½	6RH552	BTS-1.2Meg	
R65	560KΩ	½	6RH597	BTS-560K	
R66	22KΩ	½	6RH297	BTS-22K	
R67	2200Ω	½	6RH089	BTS-2200	
R68	6800Ω	½	6RH438	BTS-6800	
R69	2700Ω	½	6RH577	BTS-2700	
R70	22KΩ	½	6RH028	BTS-22K	
R71	10KΩ	½	6RH048	BTS-10K	

ITEM No.	RATING OHMS	RATING WATT	MOTOROLA PART No.	IRC PART No.	NOTES
R72	100Ω	½	6RH018	BTS-100	
R73	8200Ω	2	6K320179	BTS-8200	
R74	5600Ω	½	6RH517	BTS-5600	
R75	120Ω	½	6RH551	BTS-120	
R76	100KΩ	½	6RH030	BTS-100K	
R77	100KΩ	½	6RH031	BTS-100K	
R78	100KΩ	½	6RH031	BTS-100K	
R79	22KΩ	½	6H6397	BTS-22K	
R80	4.7Ω	1	17K4812266		
R81	4.7Meg	½	6RH233	BTS-4.7Meg	
R82	100KΩ	½	6RH239	BTS-1000	
R83	56000Ω	½	6RH017	BTS-5600	
R84	47KΩ	½	6RH048	BTS-47K	
R85	68KΩ	½	6RH074	BTS-68K	
R86	4700Ω	½	6RH080	BTS-4700	
R87	4700Ω	½	6RH080	BTS-4700	
R88	470Ω	½	6RH090	BTS-470	
R89	330KΩ	½	6RH096	BTS-330K	
R90	680Ω	1	6RH821	BTA-680	
R91	150KΩ	½	6RH0053	BTA-150K	
R92	150KΩ	1	6RH0053	BTA-150K	
R93	3.3Ω	1	17K485412		
R94	15Ω	½		BTS-15	Note 2
R95	6.8Ω	1	6K120580		
R96	7.5Ω	5	17A711590		

Note 1: Some versions may use a 4.7Meg resistor in this application.
Note 2: Not used in some versions.

TRANSFORMER (FILAMENT)

ITEM No	RATING PRI	RATING SEC 1	RATING SEC 2	MOTOROLA PART No	Stancor PART No	Merit PART No	Triad PART No	RCA TYPE No	Halldorson PART No	Thordarson PART No
T1	117VAC	6.3VAC ⑤..6A	⑩.0.3A	25BT33199	P-8308 ①	P-2949 ②	F-21A ③		F-661K ④	21F18 ⑤

① Drill new mounting holes.
② Tape 6.3V CT.

TRANSFORMERS (SWEEP CIRCUITS)

ITEM No	USE	MOTOROLA PART No	Halldorson PART No	Merit PART No	RCA TYPE No	Rom PART No	Stancor PART No	Thordarson PART No	Triad PART No
T2	Vert. Osc. Trans.	25BT30179	B870H	A-3003		V-605	A-8125	24A187 ①	A-97X
T3	Horiz. Output Trans.	24K733584 ②				X18 *	A-8340 *		
		24K733497 ② ③							
T4	Vert. Output Trans.	25K721027 ④	Z1805 ⑤ ⑥	A-3081 ⑤ ⑥		V306 ⑤	A-8140 ⑤ ⑥	2857 ⑤ ⑥	A-110X ⑤
		25BT31015 ④							
T5A B	Yoke-Horiz. (24.5MM) Vert. (9.5MM)	24K732110 ⑦ ⑧	DF003 ⑨	MDF-74 ⑦ ⑧	214DI ⑨	Y70F25/3 ⑦ ⑧	DY-10A ⑨	Y-1L ⑦ ⑧	Y-20-1 ⑦ ⑧
		24K733438 ⑦ ⑧							
		24C733431 ⑦ ⑧							

① Drill new mounting hole(s).
② Includes V31, HV Rectifier.
③ Alternate horizontal output transformer.
④ Alternate vertical output transformer.
⑤ Connect as auto transformer.
⑥ Use 50 ω 1 turns ratio.
⑦ Includes octal plug. Motorola part no. 28A722677, does not include rear cover and position device, Motorola part no. 48A722145 (for all except 24C733436 deflection yoke), Motorola part no. 48A733487 (for 24C733436 deflection yoke only).
⑧ Alternate deflection yoke.
⑨ Jumper terminals #1 and #8.
⑩ Use original rear cover and positioning device.
⑪ Use original yoke damping network.

*HORIZONTAL OUTPUT TRANSFORMER CONNECTION DATA

Use Original Width Coil Unless Replacement Type Is Listed

ORIGINAL TERMINAL CONNECTIONS	Halldorson Replacement Connections	Merit Replacement Connections	RCA Replacement Connections	Rom Replacement Connections	Stancor Replacement Connections	Thordarson Replacement Connections	Triad Replacement Connections
6				6	5		
5				5	4		
4				4	3		
3				3	2		
1				1	1		
Special Rem. →							

⑫ Do not use horizontal centering control.

TRANSFORMER (AUDIO OUTPUT)

ITEM No	IMPEDANCE PRI	IMPEDANCE SEC	MOTOROLA PART No	Stancor PART No	Merit PART No	Triad PART No	Halldorson PART No	Thordarson PART No	NOTES
T6	2.17KΩ	3.2Ω	21AT33443	A-3849	A-3903	S-2X ①	Z1806	22S87	① Drill one new mounting hole. ② Alternate audio output transformer.
			25BT02543 ②						

SPEAKER

ITEM No.	RATINGS SIZE	RATINGS FIELD	RATINGS V. C. IMP	MOTOROLA PART No	JENSEN PART No	QUAM PART No	NOTES
SP1	5 1/4"	87.8Ω	3.2Ω	50C732998		52E858	① Alternate 5 1/4" EM speaker
				50C732758 ①		51E858	② Used in console models - 21K20, 21K20B, Y21K20 & Y21K20B
				50C732997 ①		52E858	
				50C732529 ②		52E858	
	8"	87.8Ω	3.2Ω	50K700850 ②		8E858	
				50C700337 ②		8E858	
				50C700398 ②		8E858	
				50C732184 ②		8E858	
				50C732294 ②		8E858	

COILS (RF-IF)

ITEM No.	USE	DC RES PRI	DC RES SEC	MOTOROLA PART No	MEISSNER PART No	MERIT PART No	MILLER PART No.	NOTES
L1	Ant. Trans.	.7Ω	0Ω	24K730677				
L2	Ant Trans.	.7Ω	0Ω	24K730877				
L3	IF Trap	0Ω		24A734306				
L4	FM Trap	0Ω		24A734307				
L5	VHF IF Input Coil	0Ω		34A731036				
L6	UHF Ant. Coil	0Ω		24A732652				
L7	VHF Ant. Coil	0Ω		24K734309				
L8	VHF Low End Ant. Shunt Coils	0Ω		24C734302				
L9	VHF IF Trap	0Ω		24K734304				
L10	VHF High End Ant. Shunt Coils	0Ω		24K734303				
L11	Fil. Choke	0Ω		34K730391				
L12	VHF Neut. Coil	0Ω		34BT21256				
L13	VHF RF Coil	0Ω		24A734305				Channel 13
L14	VHF RF Coils	0Ω		34BT34378				
L15	UHF RF Coil	0Ω		24A734360				
L16	RF Choke	0Ω		34A732853				
L17	RF Choke	0Ω		34A732652				
L18	VHF Osc. Coils	0Ω		24A730726				Channel 13
L19	VHF Osc. Coils	0Ω		24K730939				
L20	VHF Conv. Plate	.1Ω		24BT34308				
L21	1st. Video IF	0Ω		24K733575	17-4522 ▲		6226 ††	
L22	2nd. Video IF	.1Ω	.1Ω	24BT33484	17-4503 ▲		6217 ▲	Includes 41.25MC trap
L23	Fil. Choke	0Ω		24K730291	19-1001	TV-189	6604	1 3 Microhenries
L24	3rd. Video IF	0Ω	0Ω	24BT33485	17-4504 ▲		6218	Includes 47.25MC trap
L25	RF Choke	0Ω		24K732577	19-1003		4609	3.3 Microhenries, IRC part no. C1A
L26	Fil. Choke	0Ω		24K730391	19-1001	TV-189	6604	1.3 Microhenries Includes capa., 1N4, and coils
L27	4th. Video IF	.1Ω		34BT30616				
L28	Series Peaking Coil	6.5Ω		34R130588	19-4300 *	TV-184 *	6134 *	300 Microhenries, wound on 10KΩ resistor
L29	Shunt Peaking Coil	8Ω		34R128694	19-3250	TV-185	6181	270 Microhenries
L30	Series Peaking Coil	1.8Ω		34K121738	19-1006 ▲		6612 ▲	Wound on 8.2KΩ resistor
L31	4.5MC Trap	2.1Ω		1V730908	30-1004	TV-151	1469	
L32	Series Peaking Coil	7.5Ω		24R120894	19-3250 *	TV-185 *	6181 *	240 Microhenries, wound on 10KΩ resistor
L33	Shunt Peaking Coil	8Ω		34R119650	19-3180 †	TV-184 †	6180 †	190 Microhenries, wound on 10meg resistor
L34	Shunt Peaking Coil	27Ω		24K734187	19-5100		6653 ◆	1 Microhenry, wound on 4.7KΩ resistor
L35	1st. Sound IF	2.2Ω		24K703212	30-1004	TV-151	1469	
L36	2nd. Sound IF	2.6Ω		24BT33873	20-1005	TV-152	1470	
L37	Ratio Det.	2.6Ω	.4OCT	24BT02543	17-1033 ●	TV-110 ●	1468 ●	Tertiary winding -.2Ω
L38	Horiz. Osc.	58Ω		1V732555	19-1578	TV-183	6210	
L39	Anti-ringing coil	32Ω						Wound on .1MMF Cap.- Note 1
L40	RF Choke	1.6Ω		34A733233	19-1005		6613	10 Microhenries
L41	RF Choke	1.6Ω		34A733235	19-1005		6613	10 Microhenries

Note 1. Some versions may use .1MFD capacitor only, omitting L39. Other versions may use a .068MMF capacitor in parallel with L39.
* Parallel with 10KΩ resistor.
■ Drill mounting holes.
▲ Use one winding only.
● Use adaptor plate and drill mounting holes.
◆ Parallel with 8.2KΩ resistor.
† Parallel with 10Meg resistor.
†† Detuna trap winding.
◆ Parallel with 4.7KΩ resistor.

SELENIUM RECTIFIER

ITEM No.	RATING CURRENT	MOTOROLA PART No.	FEDERAL PART No.	INTERNATIONAL PART No.	MALLORY PART No.	RADIO RECEPTOR PART No.	SARKES TARZIAN PART No.	NOTES
M1	.18DA	48B700555	1238A	RS-250	6S300	6Q2	300	① Used in some versions.
		48B733349 ①	1238A	RS-350	6S350	5Q81	350	
		48B731643 ①						
M2	.18DA	48B700565	1238A	RS-250	6S300	6Q2	300	
		48B733349 ①	1238A	RS-350	6S350	5Q81	350	
		48B731643 ①						

PARTS LIST AND DESCRIPTIONS (Continued)

FUSES

ITEM No.	TYPE	RATING	REPLACEMENT DATA					
			MOTOROLA PART No.		LITTELFUSE PART No.		BUSS PART No.	
			FUSE	HOLDER	FUSE	HOLDER	FUSE	HOLDER
M3	1" piece #26 wire							

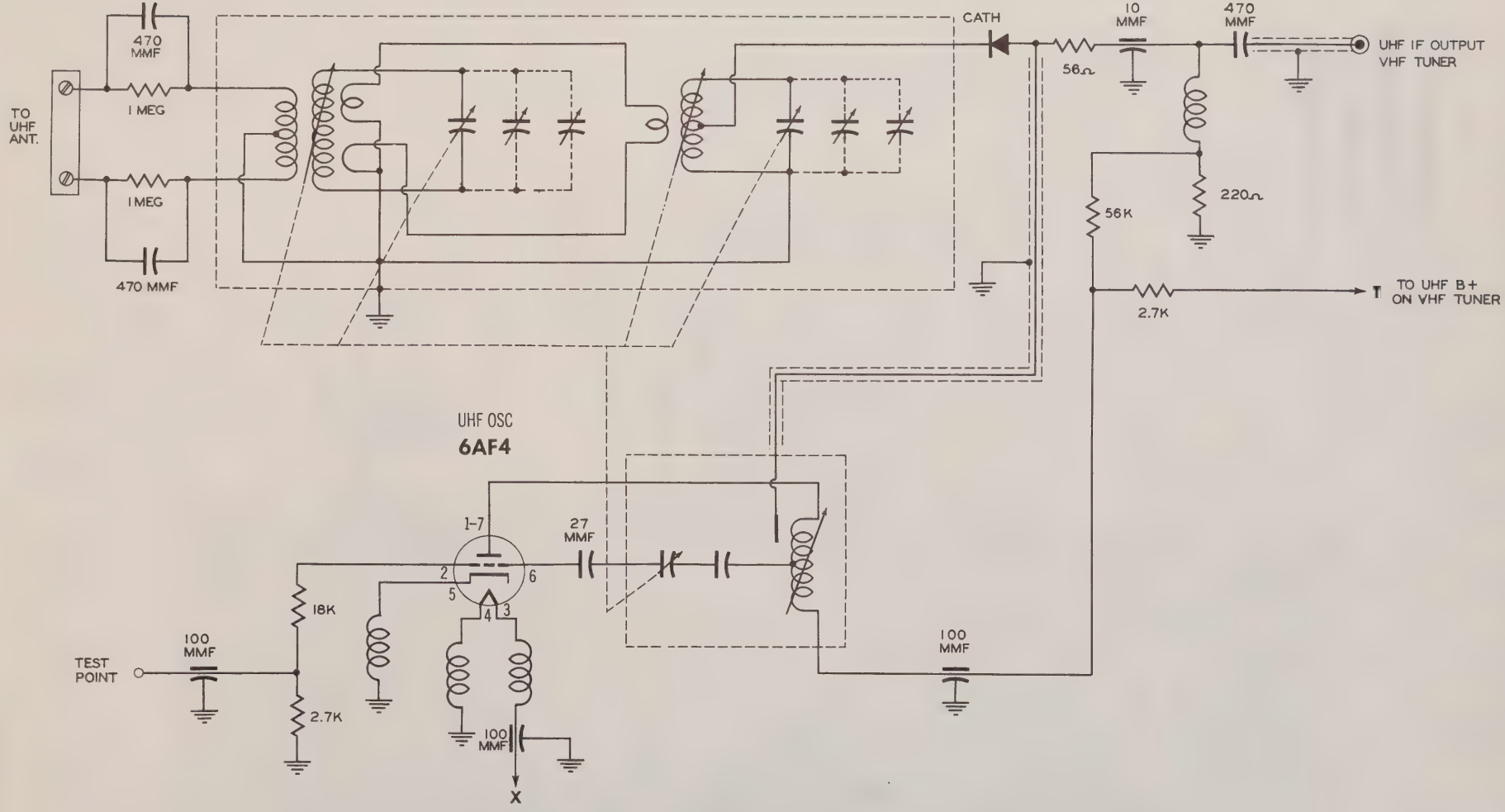
CRYSTAL DIODES

ITEM No.	ORIG. TYPE	REPLACEMENT DATA			NOTES
		MOTOROLA PART No.	SYLVANIA PART No.		
M4		48K733204*	1N60 or 1N132		Video Det.

* Alternate part numbers.
48C711052
48K711077
48K722720
48K733158
48K712199

MISCELLANEOUS

ITEM No.	PART NAME	MOTOROLA PART No.	NOTES
M5	Dial Light		#44, Bayonet
M6A	Tuner	1U733422	VHF - Chassis WTS-525
B	Tuner	1U733614	VHF - Chassis RTS-525, RTS-525Y, WTS-525Y
M7	Tuner	WTT-37	UHF - Chassis RTS-525Y, WTS-525Y
M8A	Centering Device	48A721145	Includes yoke cover - (For all yokes except Motorola yoke part #24C733436)
	Centering Device	48A733487	Includes yoke cover - (For Motorola yoke part #24C733436 only)
M9	Ion Trap	59K734027 or 59K734028	
	Cabinet	16F733329	Models 21K20, Y21K20
	Cabinet	16K733330	Models 21K20B, Y21K20B
	Cabinet	16E733431	Models 21T18, Y21T18
	Cabinet	16K733432	Models 21T18B, Y21T18B
	Knob	36K733398	Channel Selector - Models 21K20, B
	Knob	36K730174	Channel Selector - Models 21T18, B
	Knob	36B733397	VHF - Channel Selector - Models Y21K20, B
	Knob	36B730171	VHF - Channel Selector - Models Y21T18, B
	Knob	36C733399	Contrast - Models 21K20, B, Y21K20, B
	Knob	36C730162	Contrast - Models 21T18, B, Y21T18, B
	Knob	36C730167	Tone - Models 21K20, B, Y21K20, B, 21T18, B, Y21T18, B
	Knob	36B733395	Fine tuning & on-off- volume - Models 21K20, B, Y21K20, B
	Knob	36B733493	Fine tuning & on-off-volume - Models 21T18, B, Y21T18, B
	Knob	36B733492	Horiz., Vert., Brightness - All Models
	Scale	34C730165	UHF Channel Indicator - Models Y21K20, B, Y21T18, B
	Safety Glass	61K733577	Models 21K20, B, Y21K20, B
	Safety Glass	61K734345	Models 21T18, B, Y21T18, B
	Mask	13E734163	All Models



UHF TUNER WTT-37 USED ON SOME VERSIONS

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UHF TUNER SCHEMATIC

TROUBLE SHOOTING AIDS (cont)

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POWER

DEAD SET

If filaments fail to light, check AC interlock assembly. Check switch on volume control and T1. If filaments light, check R96, M1 and M2. Check B+ filter and decoupling network.

SMALL AND/OR DIM PICTURE

Check R96, M1 and M2. Check B+ filter and decoupling network.

HIGH VOLTAGE

LOSS OF HIGH VOLTAGE

Check by substitution V15, V16, V17, V18 and V12. Check waveform W16.

If Satisfactory	If Unsatisfactory
Check T3, T5A, C97, R90 and other associated components.	Check L38, C91, C92, C93, C96, R86, R83, R85 and other associated components.

INSUFFICIENT HIGH VOLTAGE

Check by substitution V16 and V17. Check M1 and M2. Check R96, R90, R87, C94, C95 and other associated components.

BLOOMING

Check by substitution V16, V17 and V18. Check M1 and M2. Check T3, R96, R90, C96 and other associated components.

GENERAL

RASTER, SOUND, NO PICTURE

Follow procedure outlined under "Loss of Video".

RASTER, PICTURE, NO SOUND

Follow procedure outlined under "Weak or No Sound".

RASTER, NO SOUND, NO PICTURE

Check by substitution V1, V2, V3, V4, V5 and V6. Check C70 and other components associated with video IF stages.

NO RASTER, NO SOUND

Follow procedure outlined under "Dead Set".

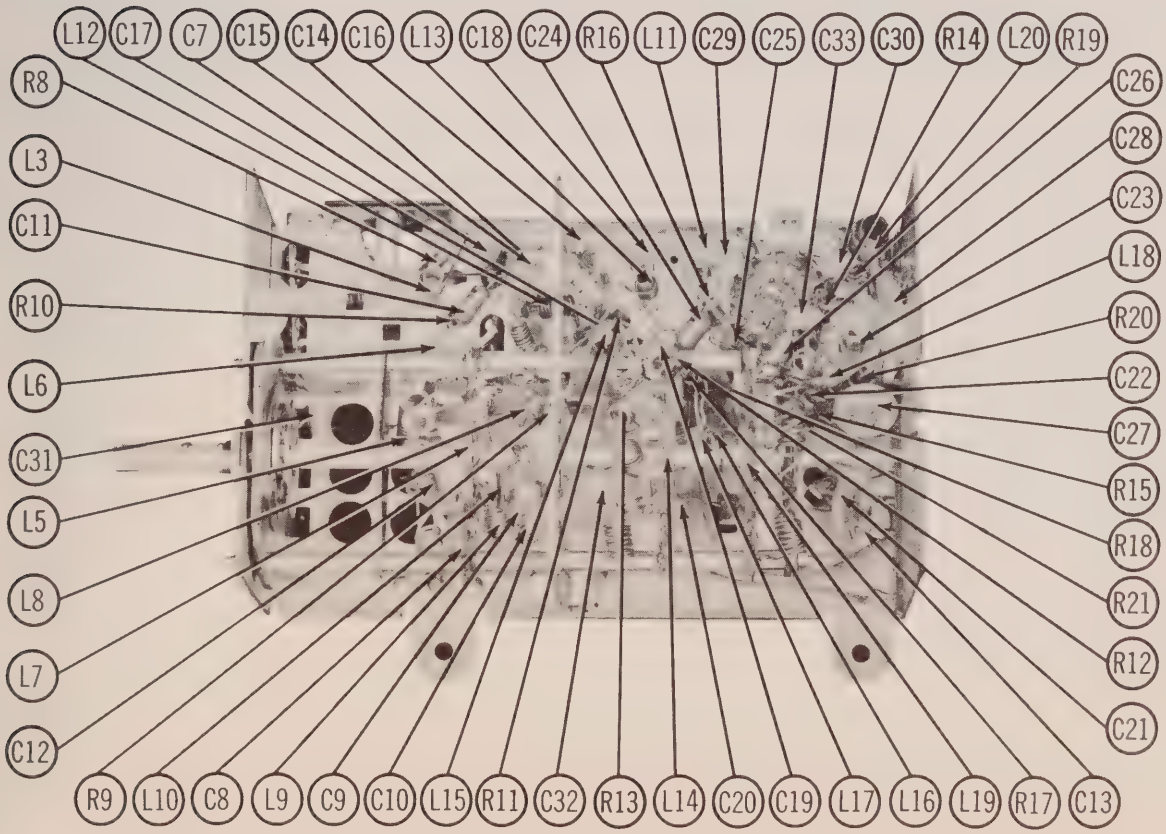
KEYSTONE EFFECT

Check T5 and its associated components.

INTERMITTENT STREAKS

Check high voltage section for corona discharge and arcing.

Symptoms shown are assumed and are not indicative of the quality and workmanship of this equipment.



RF TUNER BOTTOM VIEW

SERVICING IN THE FIELD

TUNER OSCILLATOR ADJUSTMENTS

For touch-up adjustment of VHF Tuner Oscillator adjustments, it is necessary to remove the chassis from the cabinet. (See Disassembly Instructions.)

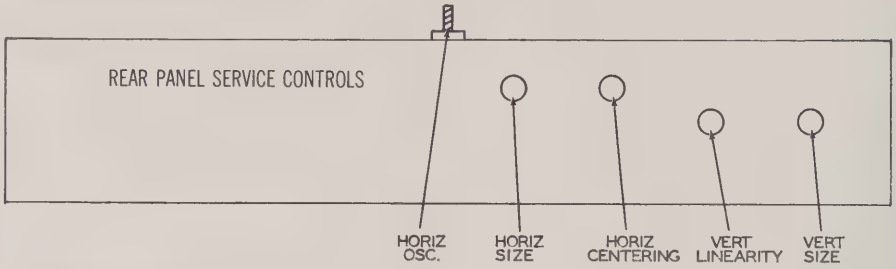
PICTURE TUBE SAFETY GLASS CLEANING

To clean safety glass, remove 4 wood screws holding metal strip at the top of safety glass. Remove metal strip and safety glass. Use extreme caution when removing safety glass.

PICTURE TUBE REMOVAL

For picture tube removal it is necessary to remove chassis. (See disassembly instructions.)

SERVICE ADJUSTMENT LOCATION



HORIZONTAL OSCILLATOR FIELD ADJUSTMENT

To adjust the horiz. osc., it is necessary to remove the rear cover and supply power to set. Adjustment is located on top of chassis. Set horiz. hold control at the center of its range and adjust the horiz. osc. slug (L38) until picture synchronizes horizontally. For location see tube placement chart.

SOUND IF DETECTOR BUZZ ADJUSTMENT

To eliminate sound IF detector buzz, adjust ratio detector secondary located on bottom of chassis. (See tube replacement chart for location.) Chassis removal is necessary for adjustment.

FUSES

One fuse is used for filament protection. (For location see Tube Placement Chart.)

CENTERING

Centering is accomplished mechanically by adjusting two magnetic rings around the neck of the picture tube, located flush against the deflection yoke. Rotate the two rings around the neck of the tube until the picture is properly centered.

DISASSEMBLY INSTRUCTIONS

NOTE: If it is necessary to remove the chassis for servicing, it is also necessary to remove the speaker. The speaker is the elector-magnetic type and must be connected for proper operation.

1. Remove 8 push-on type control knobs from front panel of cabinet.
2. Remove 7 wood screws and 1 metal screw from rear cover. Remove rear cover.
3. Disconnect speaker.
4. Remove 4 speaker nuts. Remove speaker.
5. Remove 2 wood screws from antenna bracket.
6. Remove 4 chassis bolts. Remove chassis.

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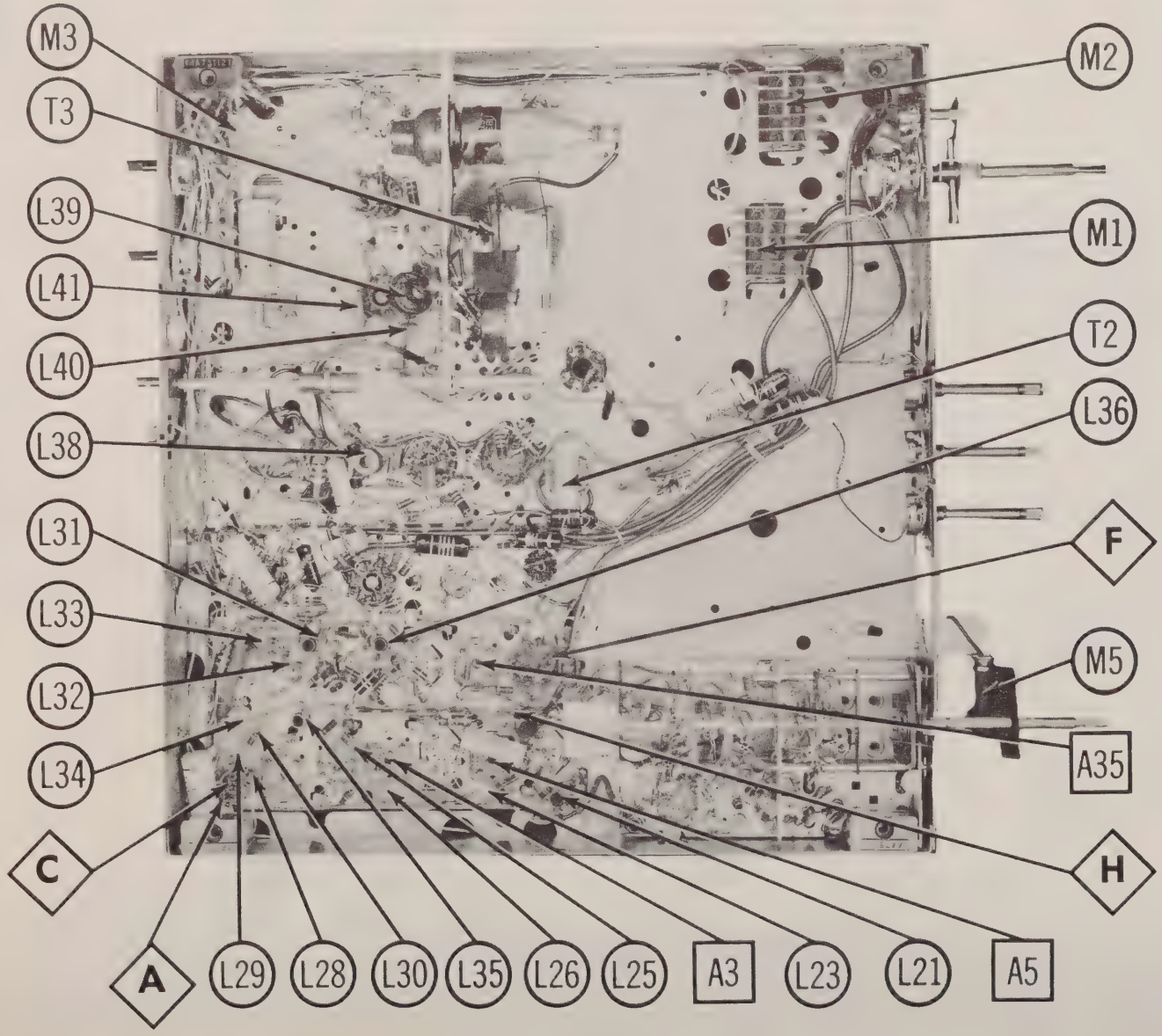

CHASSIS BOTTOM VIEW-TRANS., INDUCTOR AND ALIGNMENT IDENTIFICATION

PHILCO MODELS C-570, C-583, C-584, C-587, C-710, C-721, C-722, C-723, C-724 (Codes 124, 126)

PROPERTY OF
L. V. BLANKENSHIP
3624 MEADE ST.
DENVER, COLORADO

PHILCO MODELS C-570, C-583, C-584, C-587, C-710, C-721, C-722, C-723, C-724 (Codes 124, 126)

PHILCO MODELS C-570, C-583, C-584, C-587, C-710, C-721, C-722, C-723, C-724 (Codes 124, 126)

TRADE NAME	Philco Models C-570 (Code 126), C-583, C-584, C-587 (Code 124), C-710 (Code 126), C-721, C-722, C-723, C-724 (Code 124)
MANUFACTURER	Philco Corp., Tioga & "C" Sts., Philadelphia, Pa.
TYPE SET	AC (or) AC-DC Operated AM Superheterodyne Receiver (Models C-710, C-721, C-722, C-723, C-724 Have Electric Clocks)
TUBES (Five)	Types 12BE6 Conv., 12BA6 IF Amp., 12AV6 Det-AVC-AF Amp., 35C5 Output, 35W4 Rectifier
POWER SUPPLY	110-120 Volts AC-DC (Clock Models AC Only) RATING .22 Amp. @ 117 Volts AC
TUNING RANGE—BROADCAST	540KC - 1620KC

ALIGNMENT INSTRUCTIONS—READ CAREFULLY BEFORE ATTEMPTING ALIGNMENT

Volume control should be at maximum position. Output of signal generator should be no higher than necessary to obtain an output reading. Use an insulated alignment screwdriver for adjusting.
Loop should be maintained in same relative position to chassis as when receiver is in cabinet.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	RADIO DIAL SETTING	OUTPUT METER	ADJUST	REMARKS
1	.1MFD	High side to pin 7 (grid) of 12BE6 (V1). Low side to B-.	455KC (400~ Mod)	Tuning gang fully open.	Across voice coil.	A1, A2, A3, A4	Adjust for maximum output. If isolation transformer is not used, reduce dummy antenna to .001MFD to reduce hum modulation.
2	Direct	Loop	1620KC	1620KC	"	A5	With tuning gang fully open, insert .006 inch non-metallic shim between heel of rotor and top of stator plates. Close tuning gang enough to hold shim in place. Carefully remove shim and adjust A5 for maximum output.
3	"	"	1500KC	Tune to 1500KC signal.	"	A6	Fashion loop of several turns of wire and radiate signal into loop of receiver. Adjust for maximum output.

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PARTS LIST AND DESCRIPTIONS

PHILCO MODEL C-570 (Code 126)

PARTS LIST AND DESCRIPTIONS (Continued)

TUBES (SYLVANIA, GENERAL ELECTRIC, WESTINGHOUSE)

ITEM No.	USE	REPLACEMENT DATA: PHILCO PART No.	REPLACEMENT DATA: STANDARD REPLACEMENT	RETMA BASE TYPE	NOTES
V1	Converter	12BE6	12BE6	7CH	
V2	IF Amp.	12BA6	12BA6	7BK	
V3	Det-AVC-AF Amp.	12AV6	12AV6	7BT	
V4	Output	35C5	35C5	7CV	
V5	Rectifier	35W4	35W4	5BQ	

CAPACITORS

Capacity values given in the rating column are in mfd. for Electrolytic and Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING: CAP.	RATING: VOLT	REPLACEMENT DATA: PHILCO PART No.	CENTRALAB PART No.	ERIE PART No.	MALLORY PART No.	PYRAMID PART No.	SANGAMO PART No.	
C1A	▲30	150	30-2585			FP311.4	TM-403020-150	T-040	
B	■25	150							
C	20	150							
C2	.047	200	30-4650-45			PT4147	IMP2-S47	3302147	
C3	10000		30-1238-2	DD-103	811-01	DC-511			
C4	.047	200	30-4650-45			PT4147	IMP2-S47	3302147	
C5	5000		30-1238-14	DD-502	801-005	DC-525			
C6A	220		♦30-1293-7						
B	7000								
C7	.022	400	30-4650-43			PT4122	IMP4-S22	3304122	
C8	.1	400	30-4650-47			PT401	IMP4-P1	330401	
C9	.047	400	30-4650-45			PT4147	IMP4-S47	3304147	Note 1

Note 1. Model 587 (code 124) uses .047MFD capacitor, Model C570 (code 126) and Model C-710 (code 126) use 100MMF capacitor in this application. (part number 62-11009001).

♦ Items C6A and C6B are combined in one unit.

CONTROLS

ITEM No.	RATING: RESISTANCE	RATING: WATTS	REPLACEMENT DATA: PHILCO PART No.	IRC PART No.	CLAROSTAT PART No.	CENTRALAB PART No.	MALLORY PART No.	INSTALLATION NOTES
R1A	500KΩ	½	33-5566-59	Q13-133	A47-500K-Z	B-60-S	U-48	Volume - Note 1 & 2
B	Shaft		Not Req.	Not Req.	FS-3	Not Req.	Not Req.	Attach to R1A
C	Switch		Not Req.	76-1	SWE-12	Not Req.	US-26	Attach to R1A
R1A	500KΩ	½	33-5566-41	Q13-133	A47-500K-Z	B-60-S	U-48	Volume - Note 3
B	Shaft		Not Req.	Not Req.	FS-3	Not Req.	Not Req.	Attach to R1A
C	Switch		Not Req.	76-1	SWE-12	Not Req.	US-26	Attach to R1A

Note 1. Models C-722 and M-724 use control part no. 33-5565-77. (No on-off switch).
Note 2. Model C-710 (code 126) uses part no. 33-5565-71.
Note 3. Used only in Models C-570 (code 126) and C-587 (code 124).

RESISTORS

ITEM No.	RATING: OHMS	RATING: WATT	REPLACEMENT DATA: PHILCO PART No.	IRC PART No.	NOTES
R2	22KΩ	½	66-3228340	BTS-22K	
R3	4700Ω	½	66-2478340	BTS-4700	
R4	47KΩ	½	66-3478340	BTS-47K	
R5	2.2Meg	½	66-5228340	BTS-2.2Meg	
R6	10Meg	½	66-6108340	BTS-10Meg	
R7	470KΩ	½	66-4478340	BTS-470K	

ITEM No.	RATING: OHMS	RATING: WATT	REPLACEMENT DATA: PHILCO PART No.	IRC PART No.	NOTES
R8	470KΩ	½	66-4478340	BTS-470K	
R9	150Ω	½	66-1158340	BTS-150	
R10	1000Ω	½	66-2108340	BTS-1000	
R11	220Ω	1	66-1224340	BTA-220	
R12	880Ω*		33-1343-3		*

* Tube saver resistor, at normal room temperature resistance is 880Ω; when hot, resistance drops to 100Ω.

TRANSFORMER (AUDIO OUTPUT)

ITEM No.	IMPEDANCE: PRI.	IMPEDANCE: SEC.	REPLACEMENT DATA: PHILCO PART No.	Stancor PART No.	Merit PART No.	Triad PART No.	Halldorson PART No.	Thordarson PART No.	NOTES
T1	2.7KΩ	3.3Ω	32-8384 32-8384-2 ①	A-3332	A-3025	S-12X	Z1101	26S58	① Used in models C-583, C-587, C-721 and C-723.

SPEAKER

ITEM No.	RATINGS: SIZE	RATINGS: FIELD	RATINGS: V. C. IMP.	REPLACEMENT DATA: PHILCO PART No.	JENSEN PART No.	QUAM PART No.	NOTES
SP1	4"	PM	3.3Ω	36-1654	ST-113 Mod. P4-X	4A07	

COILS (RF-IF)

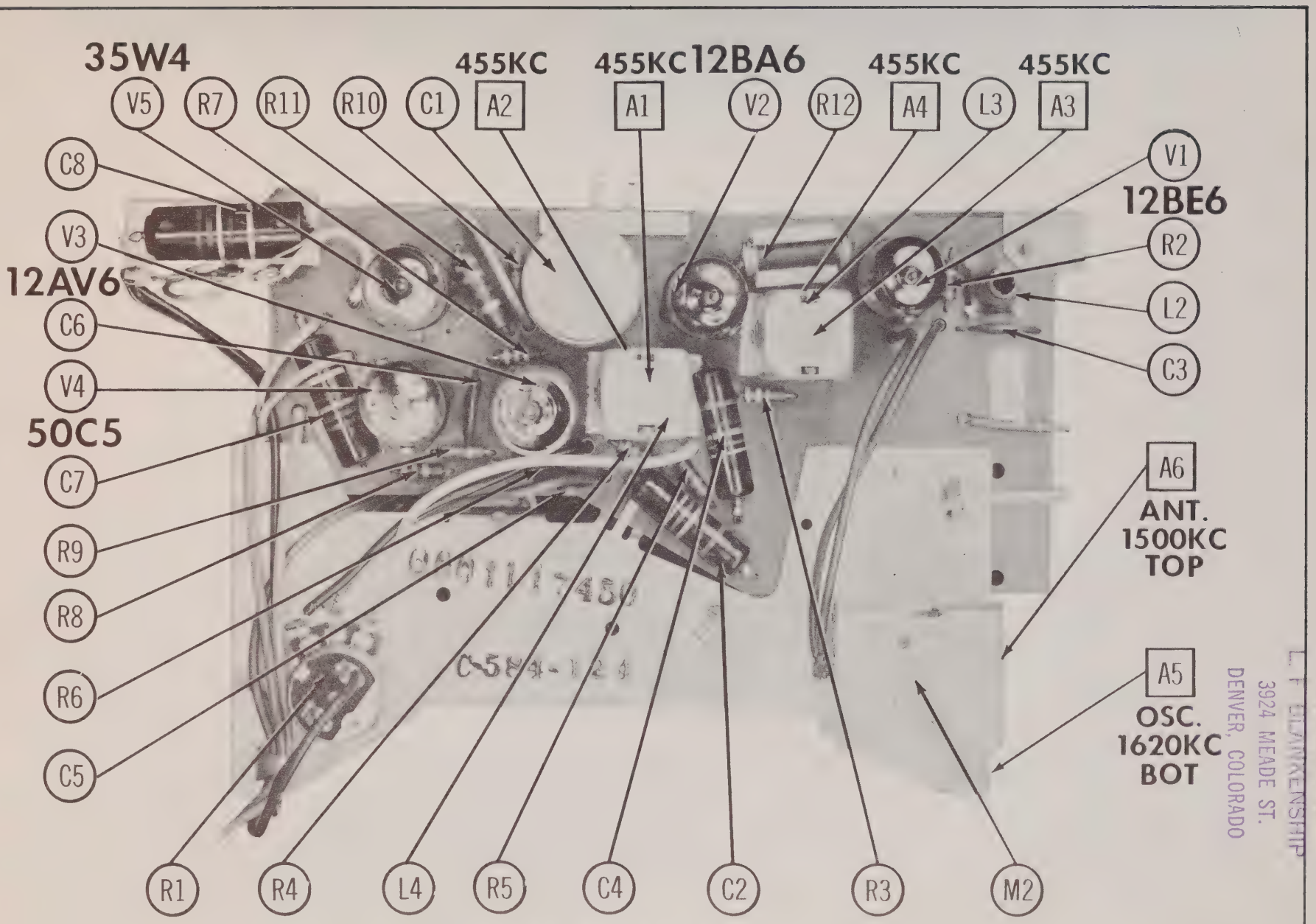
ITEM No.	USE	DC RES.: PRI.	DC RES.: SEC.	REPLACEMENT DATA: PHILCO PART No.	MEISSNER PART No.	MERIT PART No.	MILLER PART No.	NOTES
L1	Loop Ant.	3.4Ω		76-8995-2				Models C-584, C-583, C-723; Note 1 Tapped ⓐ . 9Ω - Note 2
L2	Osc. Coil	11Ω		32-4582-1				
L3	Input IF	15Ω	15Ω	32-4583-3	16-6758	BC-352	12-C1	
L4	Output IF	15Ω	15Ω	32-4584-1	16-6770	BC-355	12-C6	

Note 1: Models C-722 & C-721 use part #76-8995-3 in this application.
Model C-724 uses part #76-8995-1 in this application.
Model C-570 uses part #76-8515-2 in this application.
Model C-710 uses part #76-8711-2 in this application.
Model C-587 uses part #76-8362-3 in this application.

Note 2: Models C-570 (code 126), C-584 (code 124), C-710 (code 126) use osc. part #32-4582, Miller part #70-Osc. (use secondary winding & tap) and Merit part #BC-381 (use secondary winding & tap).

MISCELLANEOUS

ITEM No.	PART NAME	PHILCO PART No.	NOTES
M1	Dial Light	34-2068	#47, Bayonet--Used in all models except C-570.
M2	Tuning Cap.	31-2735-5	2 Gang; 13-380MMF; 18-145MMF. Models C-583, C-584, C-721, C-722, C-723 and C-724.
	Tuning Cap.	31-2751-16	Models C-570 and C-587.
	Tuning Cap.	31-2776-1	Model C-710.
M3	Clock	41-2048-5	Model C-722
	Clock	41-2048-6	Models C-724 and C-723
	Clock	41-2048-1	Model C-721
	Clock	41-2041-5	Model C-710
M4	Switch	42-1796-7	Radio-Phono - Model C-587 only.
	Cabinet	11036-1	Maroon - Models C-584, C-722 and C-724
	Cabinet	11036-2	Forest Green - Models C-584, C-722 and C-724
	Cabinet	11036-4	Ivory - Models C-584 and C-724
	Cabinet	11036-3	Models C-583, C-721 and C-723
	Cabinet	10990-13	Cardinal - Model C-570
	Cabinet	10990-16	Maroon - Model C-570
	Cabinet	10990-14	Sand - Model C-570
	Cabinet	10924-17	Model C-710
	Cabinet	10926-33	Ivory - Model C-587
	Cabinet	10926-35	Old Rose - Model C-587
	Cabinet	10926-34	Spruce Green - Model C-587



CHASSIS TOP VIEW

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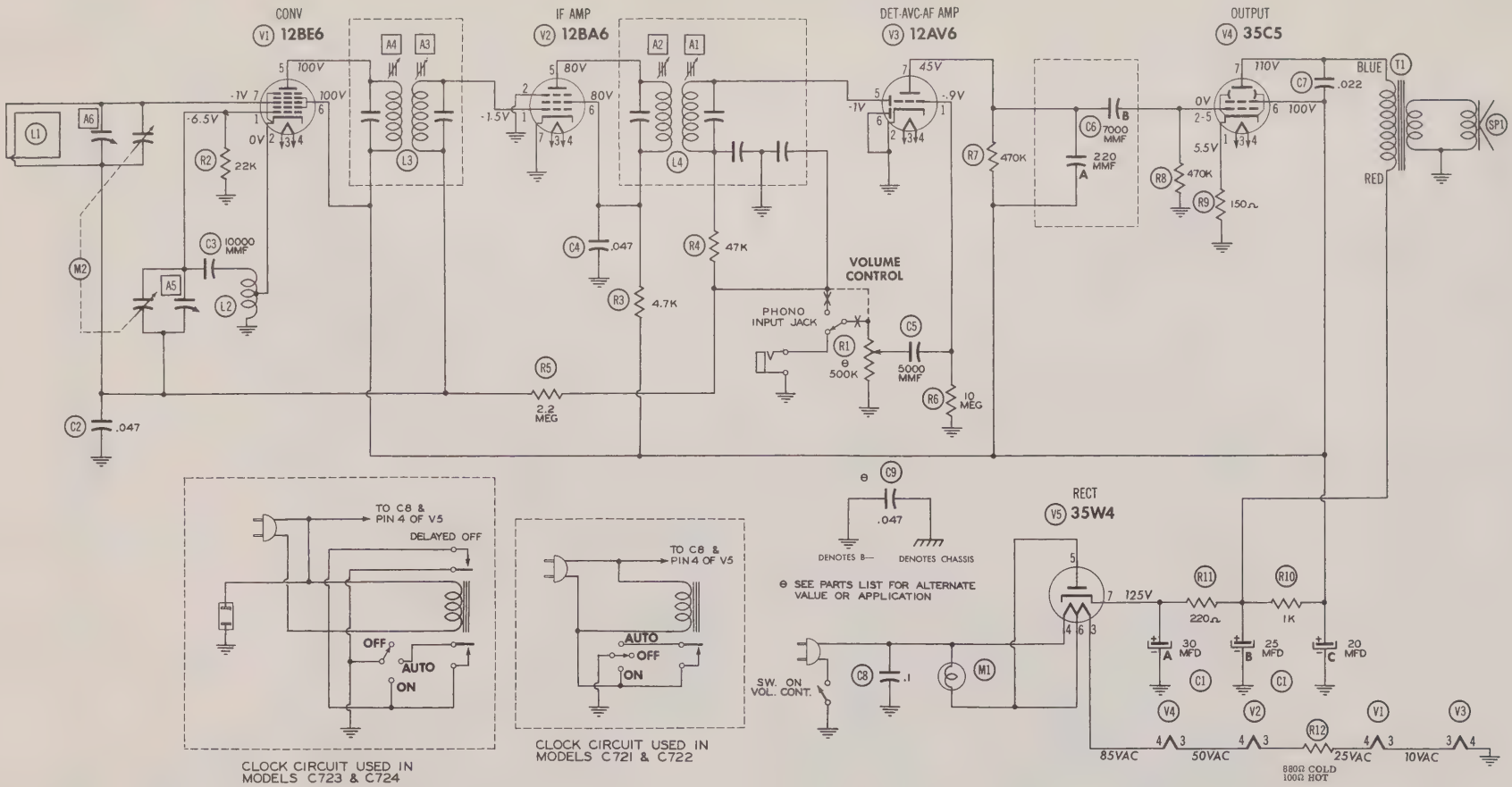

IF=455 KC

THE COOPERATION OF THE MANUFACTURER OF THIS RECEIVER MAKES IT POSSIBLE TO BRING YOU THIS SERVICE

RESISTANCE READINGS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7
V 1	12BE6	22KΩ	.2Ω	12Ω	24Ω	†1.2KΩ	†1.2KΩ	2.7Meg
V 2	12BA6	2.7Meg	0Ω	125Ω	137Ω	†6KΩ	†6KΩ	0Ω
V 3	12AV6	10Meg	0Ω	12Ω	0Ω	550KΩ	0Ω	†470KΩ
V 4	35C5	150Ω	470KΩ	135Ω	170Ω	470KΩ	†1.2KΩ	†200Ω
V 5	35W4	200Ω	200Ω	170Ω	200Ω	190Ω	190Ω	190KΩ

† MEASURED FROM PIN #7 OF V5.

1. DC voltage measurements taken with vacuum tube voltmeter; AC voltages measured at 1000 ohms per volt.
2. Socket connections are shown as bottom views.
3. Measured values are from socket pin to common negative.
4. Line voltage maintained at 117 volts for voltage readings.
5. Nominal tolerance on component values makes possible a variation of ± 15% in voltage and resistance readings.
6. Volume control at maximum, no signal applied for voltage measurements.

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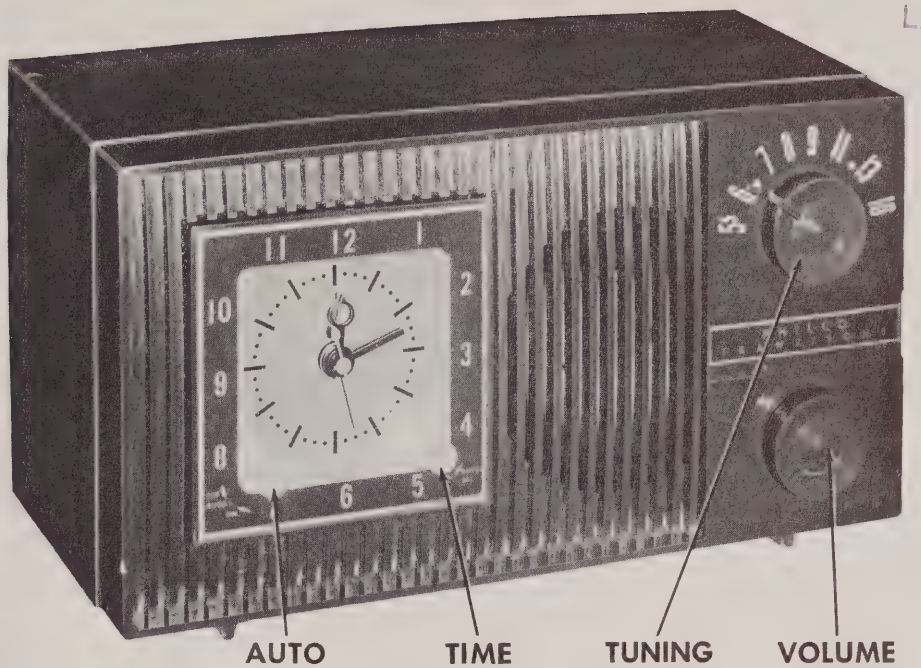
PHILCO MODELS
C-579, C-580, C-716, C-718, C-720



PHILCO MODELS
C-579, C-580, C-716, C-718, C-720

TRADE NAME	Philco Models C-579, C-580, C-716, C-718, C-720
MANUFACTURER	Philco Corp., Tioga & "C" Sts., Philadelphia, Pa.
TYPE SET	AC(or) AC-DC Operated AM Superheterodyne Receivers (Models C-716, C-718 & C-720 have Elect. Clocks)
TUBES (Four)	Types 12AU6 Conv., 12AV6 Det.-AVC-AF Amp., 50C5 Output, 35W4 Rectifier
POWER SUPPLY	105-120 Volts AC-DC (Clock Models AC only) RATING .23 Amp. @ 117 Volts AC
TUNING RANGE—BROADCAST	540KC-1620KC

ALIGNMENT INSTRUCTIONS—READ CAREFULLY BEFORE ATTEMPTING ALIGNMENT

Volume control should be at maximum position. Output of signal generator should be no higher than necessary to obtain an output reading. Use an insulated alignment screwdriver for adjusting.
Loop should be maintained in same relative position to chassis as when receiver is in cabinet.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	RADIO DIAL SETTING	OUTPUT METER	ADJUST	REMARKS
1.	.1MFD	High side to antenna stator lug. Low side to B-.	455KC (400~Mod)	Tuning gang fully open	Across voice coil	A1, A2	Adjust for maximum output. If isolation transformer is not used, reduce dummy antenna to .001MFD to reduce hum modulation.
2.	Direct	Loop	1620KC	"	"	A3	Fashion loop of several turns of wire and radiate signal into loop of receiver. Adjust for maximum output.
3.	"	"	1400KC	Tune to 1400KC signal	"	A4	"

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PARTS LIST AND DESCRIPTIONS

PHILCO MODEL C-579

TUBES (SYLVANIA, GENERAL ELECTRIC, WESTINGHOUSE)

ITEM No.	USE	REPLACEMENT DATA: PHILCO PART No.	REPLACEMENT DATA: STANDARD REPLACEMENT	RETMA BASE TYPE	NOTES
V1	Converter	12AU6	12AU6	7BK	
V2	Det.-AVC-AF Amp	12AV6	12AV6	7BT	
V3	Output	50C5	50C5	7CV	
V4	Rectifier	35W4	35W4	5BQ	

CAPACITORS

Capacity values given in the rating column are in mfd. for Electrolytic and Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING: CAP.	RATING: VOLT	REPLACEMENT DATA: PHILCO PART No.	CENTRALAB PART No.	ERIE PART No.	MALLORY PART No.	PYRAMID PART No.	SANGAMO PART No.	
C1A	■20	150	30-2585-2			FP311.4	TM-403020-150	T-040	
B	▲25	150							
C	30	150							
C2	47		30-1230-4	D6-470	GP1K-470	UC-5447			
C3	2.2		30-1221-6	TCZ-2.2	NP0K-2R2				
C4	10								Note 1
C5	.05	200	30-4650-45	DF-503		PT415	IMP2-S5	330415	
C6	47		30-1330-4	D6-470	GP1K-470	UC-5447			
C7	5000		30-1238-1	DD-502	801-005	DC-525			
C8A	5000								
B	250		♦30-6005	♦PC-70	♦1406-01				
C									
C9	100		30-1224-130	D6-101	GP1K-101	UC-531		K-1310	
C10	.02	400	30-4650-60	DF-203		PT412	IMP4-S2	330412	
C11	.047	400	30-4650-45	DF-503		PT415	IMP4-S5	330415	

Note 1. Some versions use an N4700, 12MMF in this application.
♦ Items C8A, C8B, C8C, R5A and R5B are combined in one unit. When replacing separately C8B and C8C should total 250MMF.

CONTROLS

ITEM No.	RATING: RESISTANCE	RATING: WATTS	REPLACEMENT DATA: PHILCO PART No.	IRC PART No.	CLAROSTAT PART No.	CENTRALAB PART No.	MALLORY PART No.	INSTALLATION NOTES
R1	2Meg	½	33-5575-1					Volume - Note

Note: Models C-579 & C-580 uses control part #33-5575.

RESISTORS

ITEM No.	RATING: OHMS	RATING: WATT	REPLACEMENT DATA: PHILCO PART No.	IRC PART No.	NOTES
R2	2.2Meg	½	66-5228340	BTS-2.2Meg	
R3	2200Ω	½	66-2228340	BTS-2200	
R4	10Meg	½	66-6108340	BTS-10Meg	
R5A	500KΩ	½	♦30-6005	BTS-470K	
B	500KΩ	½		BTS-470K	

ITEM No.	RATING: OHMS	RATING: WATT	REPLACEMENT DATA: PHILCO PART No.	IRC PART No.	NOTES
R6	150Ω	½	66-1158340	BTS-150	
R7	1000Ω	½	66-2108340	BTS-1000	
R8	220Ω	1	66-1224340	BTS-220	
R9	880Ω *		33-1343-6		

♦ Items R5A, R5B, C8A, C8B, C8C are combined in one unit.
* Tube save resistor, at normal room temperature resistance is 880Ω, when hot, resistance drops to 50Ω.

TRANSFORMER (AUDIO OUTPUT)

ITEM No.	IMPEDANCE: PRI.	IMPEDANCE: SEC.	REPLACEMENT DATA: PHILCO PART No.	Stancor PART No.	Merit PART No.	Triad PART No.	Halldorson PART No.	Thordarson PART No.	NOTES
T1	2.3KΩ	3.3Ω	32-8384-2	A-3332	A-3025	S-12X	Z1101	26S58	

PARTS LIST AND DESCRIPTIONS (Continued)

SPEAKER

ITEM No.	RATINGS: SIZE	RATINGS: FIELD	RATINGS: V. C. IMP.	REPLACEMENT DATA: PHILCO PART No.	JENSEN PART No.	QUAM PART No.	NOTES
SP1	4"	PM	3.3Ω	36-1655 36-1660 ① 36-1654 ②	ST-113 Mod. P4-X	4A07	① 4" PM speaker used in Models C-579 and C-580. ② 4" PM speaker used in Models C-716, C-718 and C-720

COILS (RF-IF)

ITEM No.	USE	DC RES.: PRI.	DC RES.: SEC.	REPLACEMENT DATA: PHILCO PART No.	MEISSNER PART No.	MERIT PART No.	MILLER PART No.	NOTES
L1	Ant. Coil	.7Ω		76-9228				
L2	Osc. Coil	1.1Ω	4.4Ω	32-4626				Tertiary winding -1.6Ω
L3	IF Trans.	33Ω *	33Ω	32-4627-1				* tapped ②.6Ω

MISCELLANEOUS

ITEM No.	PART NAME	PHILCO PART No.	NOTES
M1	Tuning Cap.	31-2780	2 Gang
	Cabinet	11063	Model C-579
	Cabinet	11063-3	Model C-580 (Cherry)
	Cabinet	11063-2	Model C-580 (Ivory)
	Cabinet	11062	Model C-716
	Cabinet	11062-3	Model C-718 (Ivory)
	Cabinet	11062-2	Model C-718 (Spruce green)
	Cabinet	11076-1	Model C-720
	Knob	54-6156	Tuning - Model C-579
	Knob	54-6156-1	Tuning - Model C-580
	Knob	54-6156-2	Tuning - Model C-716
	Knob	54-6156-4	Tuning - Model C-718
	Knob	54-6159-4	Tuning - Model C-720
	Knob	54-6159	On-off-volume - Model C-579
	Knob	54-6159-1	On-off-volume - Model C-580
	Knob	54-6156-3	Volume - Model C-716
	Knob	54-6156-5	Volume - Model C-718
	Knob	54-6159-5	Volume - Model C-720
	Knob	54-6096-3	Clock - 2 used - Models C-716, C-718, C-720
	Clock	41-2048-3	Model C-716
	Clock	41-2048-4	Model C-718
	Clock	41-2048-7	Model C-720
	Dial Scale	28-10231	Model C-579
	Dial Scale	28-10231-1	Model C-580
	Dial	28-10034-5	Clock Face - Model C-720

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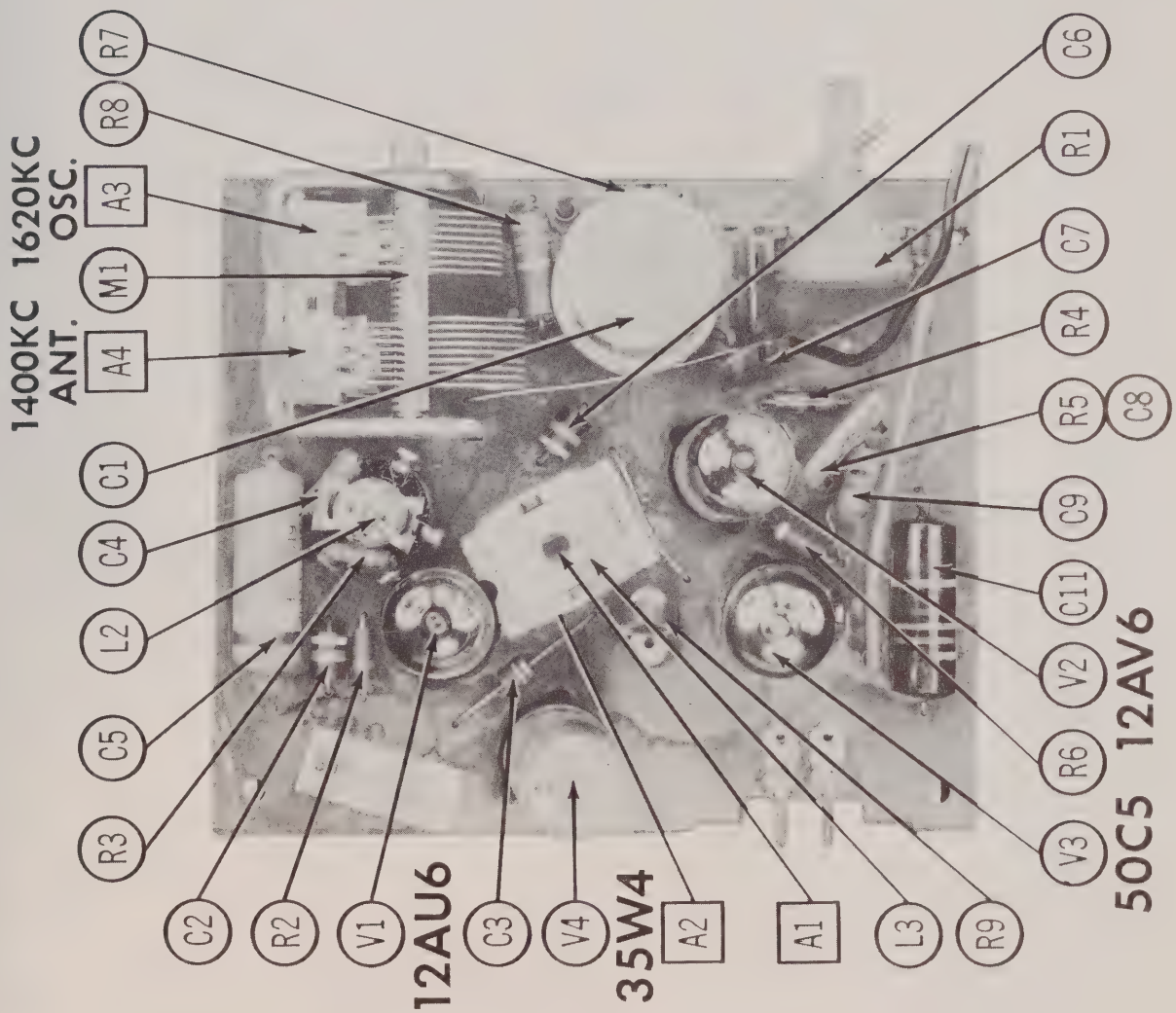

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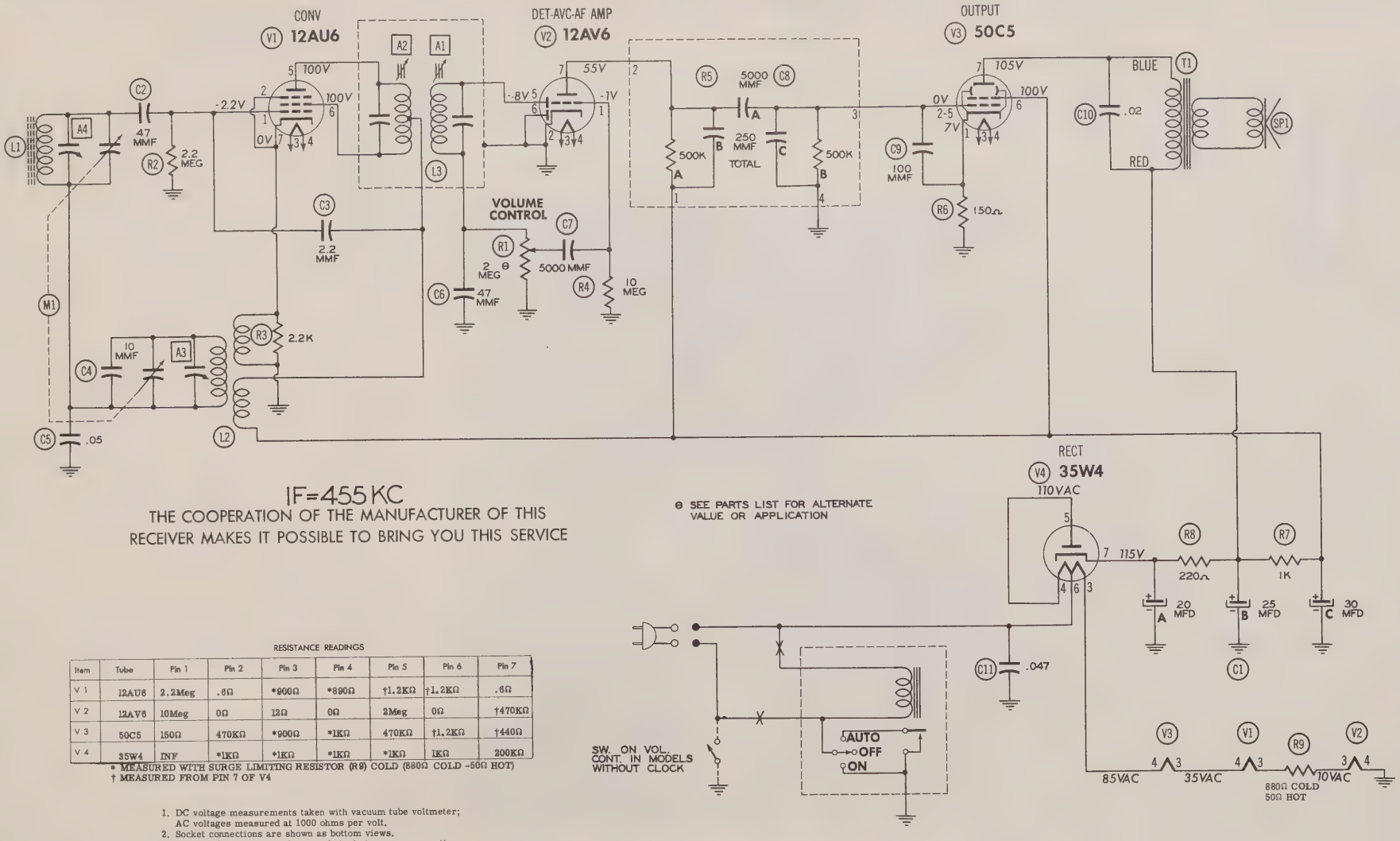

IF=455 KC

THE COOPERATION OF THE MANUFACTURER OF THIS RECEIVER MAKES IT POSSIBLE TO BRING YOU THIS SERVICE

θ SEE PARTS LIST FOR ALTERNATE VALUE OR APPLICATION

RESISTANCE READINGS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7
V 1	12AU6	2.2Meg	.6Ω	*900Ω	*890Ω	†1.2KΩ	†1.2KΩ	.6Ω
V 2	12AV6	10Meg	0Ω	12Ω	0Ω	2Meg	0Ω	†470KΩ
V 3	50C5	150Ω	470KΩ	*900Ω	*1KΩ	470KΩ	†1.2KΩ	†440Ω
V 4	35W4	INF	*1KΩ	*1KΩ	*1KΩ	*1KΩ	1KΩ	200KΩ

* MEASURED WITH SURGE LIMITING RESISTOR (R9) COLD (880Ω COLD -50Ω HOT)
† MEASURED FROM PIN 7 OF V4

1. DC voltage measurements taken with vacuum tube voltmeter; AC voltages measured at 1000 ohms per volt.
2. Socket connections are shown as bottom views.
3. Measured values are from socket pin to common negative.
4. Line voltage maintained at 117 volts for voltage readings.
5. Nominal tolerance on component values makes possible a variation of ± 15% in voltage and resistance readings.
6. Volume control at maximum, no signal applied for voltage measurements.

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*TRADE MARK

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21-S-517, U, 518, U, 519, U, 521, U, 522, U, 523, U, 525, U, 526, U, 537, U,
21-S-5022, U, 5251, U, 5252, U (Ch. KCS88B, BX, C, CX, D, DX, E, EX, J, JX,
K, KX, L, LX, M, MX, V, VA, VAX, VX)

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21-S-517, U, 518, U, 519, U, 521, U, 522, U, 523, U, 525, U, 526, U, 537, U,
21-S-5022, U, 5251, U, 5252, U (Ch. KCS88B, BX, C, CX, D, DX, E, EX, J, JX,
K, KX, L, LX, M, MX, V, VA, VAX, VX)

MODEL 21-S-501

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RCA VICTOR MODEL 21-S-501 (Ch. KCS88C)

TRADE NAME	RCA Victor	MODELS	CHASSIS	TUNER
		21-S-503, 21-S-504, 21-S-505, 21-S-506, 21-S-517, 21-S-519, 21-S-521, 21-S-522, 21-S-525, 21-S-5251, 21-S-5252	KCS88B, BX	KRK22D
		21-S-501, 21-S-502, 21-S-518, 21-S-5022	KCS88C, CX	KRK22D
		21-S-537	KCS88D, DX	KRK22D
		21-S-526	KCS88E, EX	KRK22D
		21-S-503U, 21-S-504U, 21-S-505U, 21-S-506U, 21-S-517U, 21-S-519U, 21-S-521U, 21-S-522U, 21-S-525U, 21-S-5251U, 21-S-5252U	KCS88J, JX	KRK30
		21-S-501U, 21-S-502U, 21-S-518U, 21-S-5022U	KCS88K, KX	KRK30
		21-S-537U	KCS88L, LX	KRK30
		21-S-526U	KCS88M, MX	KRK30
		21-S-523	KCS88V, VX	KRK22D
		21-S-523U	KCS88VA, VAX	KRK30

MANUFACTURER	Radio Corp. of America, RCA Victor Television Div., Camden 2, N.J.
TYPE SET	Television Receiver
TUBES	Nineteen
POWER SUPPLY	110-120 Volts AC-60 Cycles RATING 1.5 Amp. @ 117 Volts AC
TUNING RANGE	Channels 2 thru 13 VHF, 14 thru 83 UHF, Video IF 45.75MC, Sound IF 41.25MC (Intercarrier)

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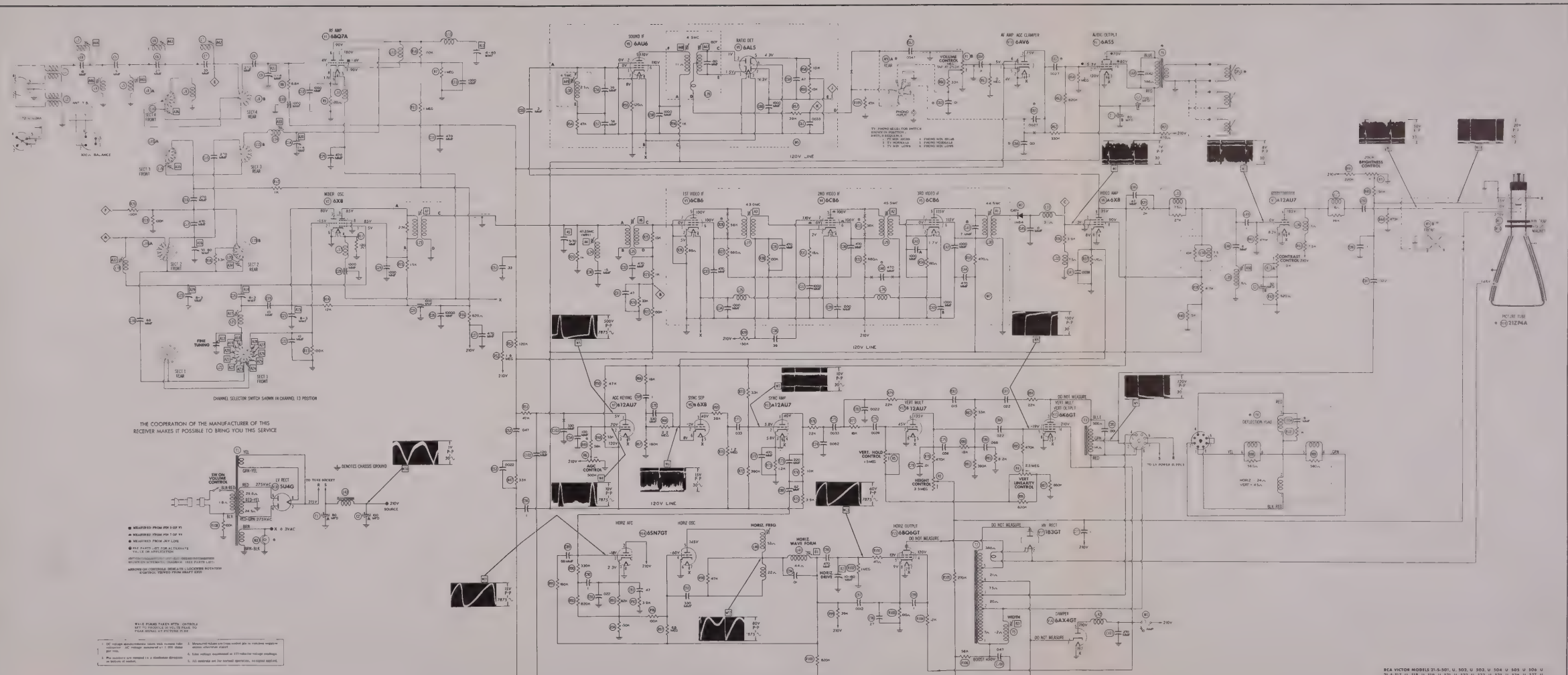
RF AMP V1 6BQ7A
SOUND IF V2 6AU6
RATIO DET V3 6AL5
AF AMP AGC CLAMPER V4 6AV6
AUDIO OUTPUT V5 6AS5
MIXER OSC V6 6X8
1ST VIDEO IF V7 6CB6
2ND VIDEO IF V8 6CB6
3RD VIDEO IF V9 6CB6
VIDEO AMP V10 6X8
ACC KEYING V11 12AU7
SYNC SEP V12 6X8
SYNC AMP V13 12AU7
VERT. MULT V14 12AU7
VERT. OUTPUT V15 6K6GT
HORIZ AFC V16 6SN7GT
HORIZ OSC
HORIZ. FREQ
HORIZ WAVE FORM
HORIZ OUTPUT V17 6BQ6GT
HV RECT V18 1B3GT
DAMPER V19 6AX4GT
LV RECT V20 5U4G
PICTURE TUBE V21 21ZP4A
120V LINE
DENOTES CHASSIS GROUND
CHANNEL SELECTOR SWITCH SHOWN IN CHANNEL 13 POSITION
THE COOPERATION OF THE MANUFACTURER OF THIS RECEIVER MAKES IT POSSIBLE TO BRING YOU THIS SERVICE
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ALIGNMENT INSTRUCTIONS

ALIGNMENT INSTRUCTIONS—READ CAREFULLY BEFORE ATTEMPTING ALIGNMENT

The high voltage lead should be securely taped and kept away from the chassis. Do not remove the horizontal oscillator tube (V14) to disable the high voltage.

VIDEO IF ALIGNMENT (MODELS 21-S-501 THRU 21-S-537; 21-S-5022, 21-S-5251, 2)

Turn the AGC control maximum clockwise.
Connect the ends of a 1000Ω potentiometer across a 7.5 volt battery capable of withstanding considerable current drain. Connect the positive terminal to chassis. Connect the potentiometer arm to point Ⓑ. Set the potentiometer arm for -4 volts at point Ⓑ.
Attenuate the signal generator output to maintain not more than -3 volts at VTVM.
Connect the synchronized sweep voltage from the sweep generator to the horizontal input of the oscilloscope for horizontal deflection.
The sweep generator output lead should be terminated with its characteristic impedance, usually 50 ohms.

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
1.	.0015MFD ceramic capacitor	High side to point Ⓐ. Low side to tuner chassis top. Use very short leads.	Not used	44.5MC (Unmod)	Any non-interfering channel	Use VTVM. DC probe to point Ⓒ. Common to chassis.	A1	Adjust for maximum deflection (final adjustment should leave core near chassis end of coil).
2.	"	"	"	45.5MC	"	"	A2	"
3.	"	"	"	43.0MC	"	"	A3	"
4.	"	"	"	47.25MC	"	"	A4	Adjust for MINIMUM deflection. (final adjustment should leave core near chassis end of coil).
5.	"	"	44MC (10MC Swp)	42.5MC 45.75MC	4	Vert. Amp. thru detector (Fig. 3) to pin 5 (plate) of V3 (6CB6).	A5, A6, A7	Connect a 330Ω carbon resistor from pin 1 (grid) of V5 (6CB6) to chassis. Connect a 180Ω carbon resistor from pin 5 (plate) to pin 6 (screen) of V3 (6CB6). Couple the signal generator loosely to the detector (Fig. 3) to provide markers. Preset A5 to MINIMUM capacity. Adjust A6 and A7 for maximum amplitude response curve with 45.75MC at 75% as in Fig. 1. Attenuate sweep generator output to maintain .3 to .5 volts peak to peak on scope for final adjustment. Adjust A5 to place 42.5MC marker at 70%. Remove the 330Ω and 180Ω resistors from V5 and V3.
6.	"	"	"	41.25MC 42.5MC 45.0MC 45.75MC	"	Vert. Amp. thru 10KΩ to point Ⓒ. Low side to chassis.		Attenuate sweep generator output to maintain 3 to 5 volts peak to peak on scope. Couple signal generator loosely to grid of first video IF amp. to provide markers on response curve. SLIGHTLY retouch A1, A2 and A3 for response similar to Fig. 2. Increase sweep generator output to view 41.25MC marker. If necessary, retouch A1 and A3 to place 41.25MC marker as shown in Fig. 2.
7.	Two 130Ω Carbon Resistors	Across antenna terminals with 130Ω in each lead.	69MC (10MC Swp)	"	4	"		Connect the negative lead of a 3 volt bias battery to pin 5 (diode) of V10 (6AV6). Connect positive side to chassis. Retouch A1 and A2 to correct any overall tilt while switching from channel to channel. Continue alignment with step 10.

VIDEO IF ALIGNMENT (MODELS 21-S-501U THRU 21-S-537U; 21-S-5022U, 21-S-5251U, 21-S-5252U)

Turn the AGC control maximum clockwise.
Connect the potentiometer arm of the bias supply to point Ⓑ. Connect the positive side to chassis. Adjust for -4 volts at point Ⓑ.
Attenuate the signal generator output to maintain not more than 3 volts at VTVM.
Connect the synchronized sweep voltage from the sweep generator to the horizontal input of the oscilloscope for horizontal deflection.

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
1.	.0015MFD Ceramic Capacitor	High side to point Ⓐ. Low side to tuner chassis top. Use very short leads.	Not used	44.5MC (Unmod)	Any non-interfering channel	Use VTVM. DC probe to point Ⓒ. Common to chassis.	A1	Adjust for maximum deflection. (Final adjustment should leave core near chassis end of coil).
2.	"	"	"	45.5MC	"	"	A2	"
3.	"	"	"	43.0MC	"	"	A3	"
4.	"	"	"	47.25MC	"	"	A4	Adjust for MINIMUM deflection. (Final adjustment should leave core near chassis end of coil).
5.	"	"	44MC (10MC Swp)	42.5MC 45.75MC	4	Vert. Amp. thru detector (Fig. 3) to pin 5 (plate) of first video IF amp.	A5, A6, A7	Connect a 330Ω carbon resistor from pin 1 grid) of the 3rd. Video IF amplifier to chassis. Connect a 180Ω carbon resistor from plate to screen (pin 5 to pin 6) of the first video IF amplifier. Preset A5 to MINIMUM capacity. Couple the signal generator loosely to detector (Fig. 3) to provide markers. Adjust A6 and A7 for maximum amplitude response curve with 45.75MC at 75% as in Fig. 1. Attenuate sweep generator output to maintain .3 to .5 volt peak to peak on scope for final adjustment. Adjust A5 to place 42.5MC marker at 70%. Remove 330Ω and 180Ω resistors from first and third video IF amplifiers.
6.	"	"	"	41.25MC 42.5MC 45.0MC 45.75MC	"	Vert. Amp. thru 10KΩ to point Ⓒ. Low side to chassis.		Attenuate sweep generator output to maintain 3 to 5 volts peak to peak on scope. Couple signal generator loosely to grid of first video IF amp. to provide markers. SLIGHTLY retouch A1, A2 and A3 for response similar to Fig. 2. Increase sweep generator to view 41.25MC marker. If necessary, retouch A1 and A3 to position 41.25MC marker as shown in Fig. 2.

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ALIGNMENT INSTRUCTIONS (cont)

VIDEO IF ALIGNMENT (MODELS 21-S-501U THRU 21-S-537U; 21-S-5022U, 21-S-5251U, 21-S-5252U) CONT.

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
7.	1000Ω Carbon Resistor in series with .0015 MFD ceramic capacitor	High side thru dummy to fron terminal of IN82 crystal holder(Remove crystal cover and connect resistor end of dummy to crystal front terminal. Insulate resistor lead). Low side to tuner chassis top. Use very short leads.	44MC (10MC Swp)	41.25MC 45.75MC	Between channels 68 and 69	Vert. Amp. thru detector (Fig. 3) to junction of 180Ω resistor and .0015 MFD. capacitor at point Ⓓ . (See remarks).	A8, A9, A10, A11	Set change-over switch to "UHF" position. Connect a .0015MFD capacitor in series with 180Ω carbon resistor from point Ⓓ to chassis with the capacitor end connected to point Ⓓ . Couple the signal generator loosely to the detector probe (Fig.3) to provide markers. Connect the potentiometer arm of a second bias supply to the tuner AGC terminal. Connect the positive side to chassis. Adjust for -3 volt at tuner AGC terminal. Attenuate sweep generator output to maintain not more than .5 volt peak to peak on scope. Adjust for maximum amplitude response curve similar to Fig. 4. If necessary, adjust A10 to position 45.75MC marker at peak of curve Adjust A11 for MINIMUM tilt. Remove 180Ω resistor and .0015MFD capacitor from point Ⓓ
8.	Two 130Ω Carbon Resistors	Across antenna terminals with 130Ω in each lead.	213MC (10MC Swp)	41.25MC 42.5MC 45.0MC 45.75MC	13	Vert. Amp. thru 10KΩ to point Ⓒ . Low side to chassis.		Attenuate sweep generator output to maintain 3 volts peak to peak on scope. Couple signal generator loosely to grid of first video IF amplifier to provide markers. Check for response similar to Fig. 2. If necessary SLIGHTLY retouch A1 and A2 to correct for any overall tilt that is essentially the same on all VHF channels.
			207MC (10MC Swp)	"	12			
			201MC (10MC Swp)	"	11			
			195MC (10MC Swp)	"	10			
			189MC (10MC Swp)	"	9			
			183MC (10MC Swp)	"	8			
			177MC (10MC Swp)	"	7			
			85MC (10MC Swp)	"	6			
			79MC (10MC Swp)	"	5			
			69MC (10MC Swp)	"	4			
			63MC (10MC Swp)	"	3			
			57MC (10MC Swp)	"	2			
9.	Remove VHF sweep generator and connect UHF sweep generator to antenna terminals. Check all UHF channels for response similar to Fig. 2. SLIGHTLY retouch A8 and A9 to correct any overall tilt. Disconnect generators and bias supplies.							

KRK22D TUNER ALIGNMENT (MODELS 21-S-501 THRU 21-S-537; 21-S-5022, 21-S-5251, 2)

A tuner unit which is operative and requires only minor touch-up adjustments will require no presetting of adjustments. When complete alignment is necessary make the following adjustments.

Pre-set A12 all the way out. Set channel 7 to 13 oscillator slugs one turn from tight.

Adjust A7 so that the slug is all the way out. Disconnect the link from terminals "A" and "B" of L25 (first video IF trans.) and terminate the link with a 39Ω carbon resistor.

Tuner alignment as outlined below requires the use of a heterodyne frequency meter.

Connect the synchronized sweep voltage from the sweep generator to the horizontal input of the oscilloscope for horizontal deflection.

The sweep generator output lead should be terminated with its characteristic impedance, usually 50 ohms.

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
10.	Direct	High side to point Ⓔ . Low side to chassis.	Not used	43.5MC (400∿Mod)	2	Vert. Amp. to point Ⓕ . Low side to chassis.	A13	Short the tuner AGC terminal to chassis. Adjust scope for maximum gain and signal generator for maximum output. Adjust for MINIMUM 400∿ indication on scope. Remove short from AGC terminal.
11.		RF input of heterodyne frequency meter to end of insulated wire inserted in hole provided for adjustment of A16	"	Set Freq. meter to 227MC	8	Not used	A14, A15, A12	Connect the potentiometer arm of the bias supply to the tuner AGC terminal. Connect the positive side to chassis. Adjust the potentiometer arm for -3 volts at tuner AGC terminal. Preset A14 for -3 volts on VTVM at point Ⓕ (limits of oscillator injection voltage are 2 -5.5 volts). Turn the fine tuning control fully clockwise. Adjust A15 for audible beat on freq. meter. Adjust A12 clockwise until beat note just begins to change, then turn one full turn in same clockwise direction. Return fine tuning control to its mid-range position.
	NOTE: If channel 8 oscillator frequency cannot be reached by adjustment of A15 switch to channel 13 and adjust A17 for channel 13 oscillator frequency, then switch to channel 12 and adjust A18 for channel 12 oscillator frequency. Continue down to channel 8 adjusting proper oscillator trimmer to obtain proper oscillator frequency on each channel. Also, on channel 8, adjust A15 for channel 8 oscillator frequency. Switch to channel 13 and adjust A17, then switch back to channel 8 and adjust A15 again.							
12.	Two 130Ω Carbon Resistors	Across antenna terminals with 130Ω in each lead.	183MC (10MC Swp)	181.25MC 185.75MC	8	Vert. Amp. to point Ⓕ . Low side to chassis.	A16, A29, A30, A31	Adjust A7 maximum counter clockwise. If a separate marker generator is used connect it loosely to antenna terminals. Adjust scope for maximum gain and attenuate sweep generator output for a MINIMUM signal input to produce usable pattern on scope. Adjust A16, A29, A30 and A31 for response similar to Fig. 5.
13.	Connect the DC probe of VTVM to point Ⓕ . Common to chassis. Adjust A14 for -3 volts at point Ⓕ . Readjust A12, A16, A29 and A30 for response similar to Fig. 5. Adjust A31 for maximum gain at mid-point of response curve. If necessary, repeat until desired response is obtained.							

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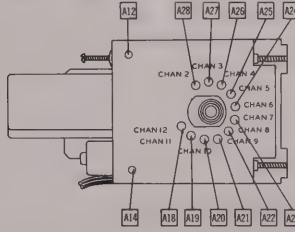
KRK12D TUNER ALIGNMENT (MODELS 21-5-501 THRU 21-5-537; 21-5-5022, 21-5-5251, 5) CONT.

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
14.		Connect frequency meter as in step 11.	Not used	Freq. meter to 257MC	13	Not used	A17	Turn fine tuning control fully clockwise. Adjust A17 for audible beat on freq. meter. SLIGHTLY overshoot the adjustment an additional turn in the same direction and then adjust A12 to again obtain an audible beat.
15.	Two 130Ω Carbon Resistors	Across antenna terminals with 130Ω in each lead.	213MC (10MC Swp)	211.25MC 215.75MC	"	Vert. Amp. to point ⓥ. Low side to chassis.	A32,A33	Adjust for response similar to Fig. 5. Turn off generator and check oscillator injection voltage at point ⓥ with VTVM. Voltage should be within limits (2-5.5Volts). If A16 required readjustment turn sweep generator back on and recheck channel 13 response. If necessary, retouch A32 and A33 to obtain desired response.
16.		Connect frequency meter as in step 11.	Not used	Freq. meter to 227MC	8	Not used	A12	Check for audible beat on freq. meter. If necessary, readjust A12 for proper oscillator frequency.
17.	Two 130Ω Carbon Resistors	Across antenna terminals with 130Ω in each lead	183MC (10MC Swp)	181.25MC 185.75MC	8	Vert. Amp. to point ⓥ. Low side to chassis.	A28,A29, A30,A31	If necessary, retouch A28,A29, A30 and A31 for response similar to Fig. 5. If A29 required adjustment turn off generator and switch back to channel 13 and check oscillator injection voltage at point ⓥ with VTVM. If the oscillator injection trimmer (A14) was far off it may be necessary to repeat steps 16 and 17 several times before proper setting of A14 is obtained.
18.		Connect freq. meter as in step 11.	Not used	Freq. meter to 129MC	6	Not used	A34	Set fine tuning control to its mid-range position. Adjust A34 for audible beat on frequency meter.
19.	Two 130Ω Carbon Resistors	Across antenna terminals with 130Ω in each lead.	85MC (10MC Swp)	83.25MC 87.75MC	"	Vert. Amp. to point ⓥ. Low side to chassis.	A34,A35, A36	Adjust for response similar to Fig. 5. Check oscillator injection voltage at point ⓥ with VTVM. If necessary, readjust A14. If A14 required readjustment, switch the receiver and generator to channel 8. Retouch A39 for response similar to Fig. 5. Recheck A12 and A15 for proper oscillator frequency as in step 11.
20.	"	"	79MC (10MC Swp)	77.25MC 81.75MC	5	"		Check for response similar to Fig. 5. If markers fall below 80% on any low band channel retouch A34, A35 and A36 for best compromise. Check oscillator injection voltage on each low band channel at point ⓥ with VTVM. It should be within limits of 2 - 5.5 volts.
			69MC (10MC Swp)	67.25MC 71.75MC	4			
			63MC (10MC Swp)	61.25MC 65.75MC	3			
			57MC (10MC Swp)	55.25MC 59.75MC	2			
21.	Two 130Ω Carbon Resistors	Across antenna terminals with 130Ω in each lead.	213MC (10MC Swp)	211.25MC 215.75MC	13	Vert. Amp. to point ⓥ. Low side to chassis.	A16, A29, A30	Check for response similar to Fig. 5. If markers fall below 80% retouch A16, A29 and A30 for best compromise on all high band channels. Check oscillator injection voltage on all high band channels at point ⓥ. with VTVM. It should be within limits of 2 - 5.5 volts.
			207MC (10MC Swp)	205.25MC 209.75MC	12			
			201MC (10MC Swp)	199.25MC 203.75MC	11			
			195MC (10MC Swp)	193.25MC 197.75MC	10			
			189MC (10MC Swp)	187.25MC 191.75MC	9			
			183MC (10MC Swp)	181.25MC 185.75MC	8			
			177MC (10MC Swp)	175.25MC 179.75MC	7			
22.		Connect freq. meter as in step 11.	Not used	Freq. meter to 257MC	13	Not used	A17	Adjust individual channel oscillator slug for audible beat on freq. meter on each channel. Check oscillator injection voltage on each channel at point ⓥ with VTVM to verify that the voltage is within limits. Continue alignment with step 23.
				251MC	12		A18	
				245MC	11		A19	
				239MC	10		A20	
				233MC	9		A21	
				227MC	8		A22	
				221MC	7		A23	
				129MC	6		A24	
				123MC	5		A25	
				113MC	4		A26	
				107MC	3		A27	
				101MC	2		A28	



ALIGNMENT INSTRUCTIONS (cont)

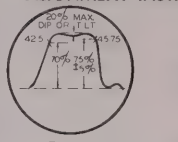


FIG. 1

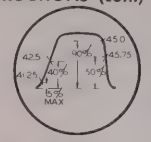


FIG. 2

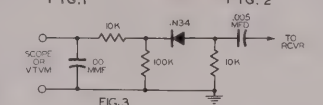


FIG. 3

FIG. 4

FIG. 5

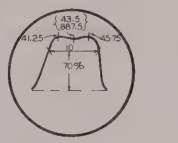


FIG. 6

FIG. 7

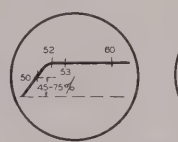


FIG. 8

FIG. 9

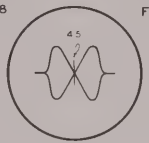


FIG. 10

KRK32 VHF TUNER ALIGNMENT (MODELS 21-5-501U THRU 21-5-537U; 21-5-5251U, 5-5-5252U, 21-5-5253U)

A tuner unit which is operative and requires only minor touch-up adjustments will require no presetting of adjustments. Where complete alignment is necessary make the following adjustments.

Pre-set A12 all the way out. Set channel 7 to 13 oscillator slugs one turn from light.

Adjust A7 so that the slug is all the way out. Disconnect the link from terminals "A" and "B" of the first video IF transformer and terminate the link with a 39Ω carbon resistor.

Tuner alignment as outlined below requires the use of a heterodyne frequency meter.

Connect the synchronized sweep voltage from the sweep generator to the horizontal input of the oscilloscope for horizontal deflection.

The sweep generator output lead should be terminated with its characteristic impedance, usually 50 ohms.

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
10	Direct	High side to point ⓥ. Low side to chassis.	Not used	43.5MC (400% Mod)	3	Vert. amp. to point ⓥ. Low side to chassis.	A13	Short the tuner AGC terminal to chassis. Adjust scope for maximum gain and signal generator for maximum output. Adjust for MINIMUM 400% indication on scope. Remove short from AGC terminal.
11		RF input of heterodyne frequency meter to end of insulated wire. Inserted in hole provided for adjustment of A18.	"	Set Freq. meter to 227MC.	8	Not used.	A14, A16, A18	Connect the potentiometer arm of the bias supply to the tuner AGC terminal. Connect the positive side to chassis. Adjust the potentiometer arm for -3 volts at tuner AGC terminal. Pre-set A14 for -3 volts on VTVM at point ⓥ. (Limits of oscillator injection voltage are 2-5.5 volts.) Turn the fine tuning control fully clockwise. Adjust A18 for audible beat on freq. meter. Adjust A12 clockwise until beat note just begins to change, then turn one full turn in the same clockwise direction. Return fine tuning control to its mid-range position.
	NOTE: If channel 8 oscillator frequency cannot be reached by adjustment of A15, switch to channel 13 and adjust A17 for channel 13 oscillator frequency, then switch to channel 13 and adjust A18 for channel 13 oscillator frequency. Continue down to channel 8 adjusting proper oscillator trimmer to obtain proper oscillator frequency on each channel. Also, on channel 8, adjust A15 for channel 8 oscillator frequency. Switch to channel 13 and adjust A17,							
12	Two 130Ω carbon resistors	Across antenna terminals with 130Ω in each lead.	[illegible] (10MC Swp)	18. 25MC 185. 75MC	8	Vert. amp. to point ⓥ. Low side to chassis.	A16, A29, A30, A31	Adjust A7 maximum counter clockwise. If a separate marker generator is used, connect it loosely to antenna terminals. Adjust scope for maximum gain and attenuate sweep generator output for a MINIMUM signal input to produce a usable pattern on scope. Adjust A16, A29, A30 and A31 for response similar to Fig. 5.
13	Connect the DC probe of VTVM to point ⓥ. Common to chassis. Adjust A14 for -3 volts at point ⓥ. Readjust A12, A16, A29 and A30 for response similar to Fig. 5. Adjust A8 for maximum gain at mid-point of response curve. If necessary, repeat until desired response is obtained.							
14		Connect frequency meter as in step 11.	Not used.	Freq. meter to 257MC	13	Not used.	A17	Turn fine tuning control fully clockwise. Adjust A17 for audible beat on freq. meter. SLIGHTLY overshoot the adjustment an additional turn in the same direction and then adjust A12 to again obtain an audible beat.
15	Two 130Ω carbon resistors	Across antenna terminals with 130Ω in each lead.	213MC (10MC Swp)	211. 25MC 215. 75MC	13	Vert. amp. to point ⓥ. Low side to chassis.	A32, A33	Adjust for response similar to Fig. 5. Turn off generator and check oscillator injection voltage at point ⓥ with VTVM. Voltage should be within limits (2-5.5 volts). If A16 required readjustment, turn sweep generator back on and recheck channel 13 response. If necessary, retouch A32 and A33 to obtain desired response.
16		Connect freq. meter as in step 11.	Not used.	Freq. meter to 227MC	8	Not used.	A13	Check for audible beat on freq. meter. If necessary, readjust A12 for proper oscillator frequency.
17	Two 130Ω carbon resistors	Across antenna terminals with 130Ω in each lead.	183MC (10MC Swp)	181. 25MC 185. 75MC	8	Vert. amp. to point ⓥ. Low side to chassis	A16, A29, A30, A31	If necessary, retouch A16, A29, A30 and A31 for response similar to Fig. 5. If A29 required adjustment, turn off generator and switch back to channel 13 and check oscillator injection voltage at point ⓥ with VTVM. If the oscillator injection trimmer, A14, was far off, it may be necessary to repeat steps 16 and 17 several times before proper setting of A14 is obtained.
18		Connect freq. meter as in step 11.	Not used.	Freq. meter to 129MC	6	Not used.	A34	Set fine tuning control to its mid-range position. Adjust A34 for audible beat on frequency meter.
19	Two 130Ω carbon resistors.	Across antenna terminals with 130Ω in each lead.	85MC (10MC Swp)	83. 25MC 87. 75MC	6	Vert. amp. to point ⓥ. Low side to chassis	A34, A35, A36	Adjust for response similar to Fig. 5. Check oscillator injection voltage at point ⓥ with VTVM. If necessary, readjust A14. If A14 required readjustment, switch the receiver and generator to channel 8. Retouch A39 for response similar to Fig. 5. Recheck A12 and A15 for proper oscillator frequency as in step 11.
20	"	"	79MC (10MC Swp)	77. 25MC 81. 75MC	5	"		Check for response similar to Fig. 5. If markers fall below 80% on any low band channel, retouch A34, A35 and A36 for best compromise. Check oscillator injection voltage on each low band channel at point ⓥ with VTVM. It should be within limits of 2-5.5 volts.
			69MC (10MC Swp)	67. 25MC 71. 75MC	4			
			63MC (10MC Swp)	61. 25MC 65. 75MC	3			
			57MC (10MC Swp)	55. 25MC 59. 75MC	2			

RCA VICTOR MODELS 21-5-501; U. 503, U. 504, U. 505, U. 506, U. 21-5-517, U. 518, U. 519, U. 521, U. 522, U. 523, U. 525, U. 526, U. 527, U. 21-5-5022, U. 5221, U. 5252, U (Ch. KCS88B, BX, C, CX, D, DX, E, EX, J, JX, K, KX, L, LX, M, MX, V, VA, VAX, VX)

ALIGNMENT INSTRUCTIONS (cont)

KRK30 VHF TUNER ALIGNMENT (MODELS 21-S-501U THRU 21-S-537U; 21-S-5022U, 21-S-5251U, 21-S-5252U) CONT.

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
21	Two 130Ω carbon resistors	Across antenna terminals with 130Ω in each lead.	213MC (10MC Swp)	211.25MC 215.75MC	13	Vert. amp. to point (A). Low side to chassis.	A16, A29, A30	Check for response similar to Fig. 5. If markers fall below 80%, retouch A16, A29 and A30 for best compromise on all high band channels. Check oscillator injection voltage on all high band channels at point (F) with VTVM. It should be within limits of 2-5.5 volts.
			207MC (10MC Swp)	205.25MC 209.75MC	12			
			201MC (10MC Swp)	199.25MC 203.75MC	11			
			195MC (10MC Swp)	193.25MC 197.75MC	10			
			189MC (10MC Swp)	187.25MC 191.75MC	9			
			183MC (10MC Swp)	181.25MC 185.75MC	8			
			177MC (10MC Swp)	175.25MC 179.75MC	7			
22		Connect frequency meter as in step 11.	Not used.	Freq. meter to 257MC	13	Not used.	A17	Adjust individual channel oscillator slug for audible beat on frequency meter on each channel. Check oscillator injection voltage on each channel at point (F) with VTVM to verify that the voltage is within limits.
				251MC	12			
				245MC	11			
				239MC	10			
				233MC	9			
				227MC	8			
				221MC	7			
				129MC	6			
				123MC	5			
				113MC	4			
				107MC	3			
				101MC	2			

KRK30 UHF TUNER ALIGNMENT (MODELS 21-S-501U THRU 21-S-537U; 21-S-5022U, 21-S-5251U, 21-S-5252U)

RF adjustments require removal of the tuner shield therefore the UHF section must be removed from the tuner assembly for RF alignment. The tuner need not be removed for IF and oscillator adjustments. Connect a 100Ω carbon resistor from the center conductor of the IF cable to chassis. (Point (G) on schematic.)

If the oscilloscope does not have a sensitivity of 5 millivolts per inch, a suitable preamplifier may be used.

Fabricate a test dial with marks scribed on its circumference at 0, 5 and 164 degrees. The dial should be made to fit over the split gear on the tuner shaft for accurate alignment. Locate the 0 degree reference point with the capacitor plates fully meshed. The stop pin on the tuner should be against the stop plate on the gear assembly when the plates are fully meshed.

Connect the high side of the VHF marker signal generator through a 1000Ω carbon resistor to point (H). Insert resistor lead (insulate lead) through operature provided for crystal removal. Connect low side to chassis. Couple the UHF marker generator loosely to the UHF antenna terminals.

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
23.	Two 130Ω Carbon Resistors	Across UHF antenna terminal with 130Ω in each lead.	887.5MC (Use max. sweep width)	41.25MC 43.5MC 45.75MC 887.5MC	83 (164 on tuning dial)	Vert. Amp. (thru pre-amp. if needed) to point (G). Low side to tuner chassis.	A37, A38, A39	Adjust A37 and A38 for maximum amplitude overcoupled response curve centered at 887.5MC similar to Fig. 6. Adjust A39 until the 43.5MC marker coincides with the 887.5MC marker. The 41.25MC and 45.75MC markers should be symmetrically located on top of response curve as in Fig. 6.
24.	"	"	473.5MC (Use max. sweep width)	41.25MC 43.5MC 45.75MC 887.5MC	14 (5 on tuning dial)	"	A40, A41	Adjust A40 until 43.5MC marker coincides with 473.5MC marker as in Fig. 7. If A40 has insufficient range adjust A41 by repositioning coil until markers coincides. Repeat steps 23 and 24 until proper responses are obtained.

25. Tune thru entire UHF range and check tracking. If the 41.25MC and 45.75MC markers fall below 70% on any UHF channel it will be necessary to bend the RF plates to correct the mistracking. The plates may be bent by using a knife blade with the shield cover removed. Knife the plates while tuning lower in frequency so that tracking above the point of knifing will not be disturbed. A check of the section requiring knifing may be made by touching the plates with the knifing tool while noting the effect on the response curve, then knifing the proper section or both sections if required.

Connect the DC probe of the VTVM to point (G). Common to chassis. Tune thru the entire UHF range at the same time noting the reading on the VTVM. Readings between .03 and .35 volts should be obtained. If voltages outside this limit are obtained, it indicates low B+ voltage, low or high crystal impedance or an oscillator tube outside allowable limits. Connect the DC probe of VTVM to point (I). Common to chassis. Readings between .5 and 2.5 volts should be obtained. Readings outside this range will cause crystal currents beyond allowable limits and in such cases the oscillator tube should be replaced. If the oscillator tube is replaced steps 23 and 24 should be repeated.

KRK22D OR KRK30 ANTENNA MATCHING UNIT ALIGNMENT

The antenna matching unit has been properly aligned at the factory. The RF unit is aligned with a particular antenna matching unit in place. If a new antenna unit is installed, the RF unit should be realigned.

The FM trap (A42) may be aligned without adversely affecting the unit.

Disconnect the lead from L7 (point (E)) to the channel selector switch. Use a short jumper to connect output of matching unit at point (E) through a .001MFD capacitor to pin 1 (grid) of the second video IF amplifier (V4). Remove the first video IF amplifier (V3) from its socket.

The matching unit cover must be in place during alignment.

Connect the potentiometer arm of the bias supply to point (B). Connect the positive side to chassis. Adjust the potentiometer arm for -5 volts at point (B).

Connect the synchronized sweep voltage from the sweep generator to the horizontal input of the oscilloscope for horizontal deflection.

The sweep generator output lead should be terminated with its characteristic impedance, usually 50 ohms.

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
26.	Direct	Across antenna terminals.	Not used	45.75MC (400∿Mod)	Any	Vert. Amp. to point (C). Low side to chassis.	A43	Adjust for MINIMUM 400∿ indication on scope.
27.	"	"	"	41.25MC	"	"	A44	"
28.	Two 130Ω Carbon Resistors	Across antenna terminals with 130Ω in each lead.	52MC (20MC Swp)	50MC 52MC 53MC	"	Vert. Amp. thru detector (Fig. 3) to point (E).	A45, A46	Remove .001MFD capacitor from point (E) to grid of V4. Connect a 300, ½ watt carbon resistor from point (E) to chassis. Use very short leads. Adjust to obtain response curve similar to Fig. 8. Repeat steps 26, 27 and 28 until no further improvement is noted. Remove the 300Ω resistor and detector probe. Restore connection from L7 to channel switch. Replace V3 in its socket.

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ALIGNMENT INSTRUCTIONS (cont)

SOUND IF ALIGNMENT USING AM SIGNAL GENERATOR AND VTVM

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	CHANNEL	CONNECT VTVM	ADJUST	REMARKS
29	.01MFD	High side to point Ⓒ. Low side to chassis.	4.5MC (Unmod)	Any non-interfering channel.	DC probe to point Ⓙ. Common to chassis.	A47, A48, A49	Adjust for maximum deflection. Attenuate generator output for 5 volts at VTVM for final adjustments. Peak A47 and A49 with core at chassis end of coil. Correct peak of A48 should occur with core farthest away from chassis end of coil.
30	"	"	"	"	DC probe to point Ⓚ. Common to chassis.	A47	Adjust for zero reading. A positive and negative reading will be obtained on either side of the correct setting.

SOUND IF ALIGNMENT USING FM SIGNAL GENERATOR AND OSCILLOSCOPE

Use frequency modulated signal with 60Ω modulation and 450KC sweep. Use 120Ω sawtooth voltage in scope for horizontal deflection.

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
29.	.01MFD	High side to point Ⓒ. Low side to chassis.	4.5MC (450KC Swp)	4.5MC	Any non-interfering channel	Vert. Amp. to point Ⓙ. Low side to chassis.	A48, A49	Disconnect stabilizing capacitor C59. Adjust for curve of maximum amplitude and symmetry similar to Fig. 9.
30.	"	"	"	"	"	Vert. Amp. to point Ⓚ. Low side to chassis.	A47	Reconnect stabilizing capacitor C59. Adjust so that 4.5MC occurs at center of crossover lines as in Fig. 10. SLIGHTLY retouch A48 for maximum amplitude and straightness of crossover lines.

4.5MC TRAP ALIGNMENT

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
31.	.0015MFD	High side to point Ⓒ. Low side to chassis.	Not used	4.5MC (400% Mod)	Any	Vert. Amp. thru detector (Fig. 3) to pin 6 (plate) of video output tube (V7A).	A50	Short pin 1 (grid) of 3rd. Video IF amp. (V5) to chassis. Adjust generator output for approximately 0.5 volts output. Adjust A50 for MINIMUM 400% indication on scope. Remove short from pin 1 of V5.

ALTERNATE 4.5MC TRAP ALIGNMENT

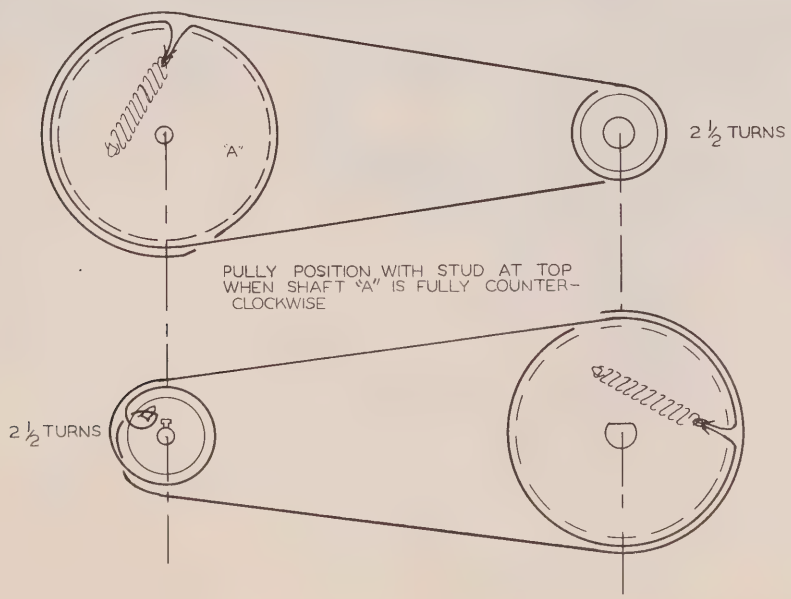
Restore set to normal operating condition and tune in a TV station. Inspect the picture for evidence of 4.5MC beat interference. IF a 4.5MC beat is noted turn fine tuning control slightly clockwise to emphasize the 4.5MC beat interference, then adjust A50 to minimize the 4.5MC beat.

FM TRAP ALIGNMENT

Tune in a TV station on which FM interference is noted and adjust A42 to minimize the FM interference in the picture. Use care when adjusting since the trap may be adjusted to attenuate stations on channel 5 or 6. If these channels are received, check to see that adjustment A42 does not affect sensitivity on these channels.

TELEVISION CHANNEL FREQUENCIES

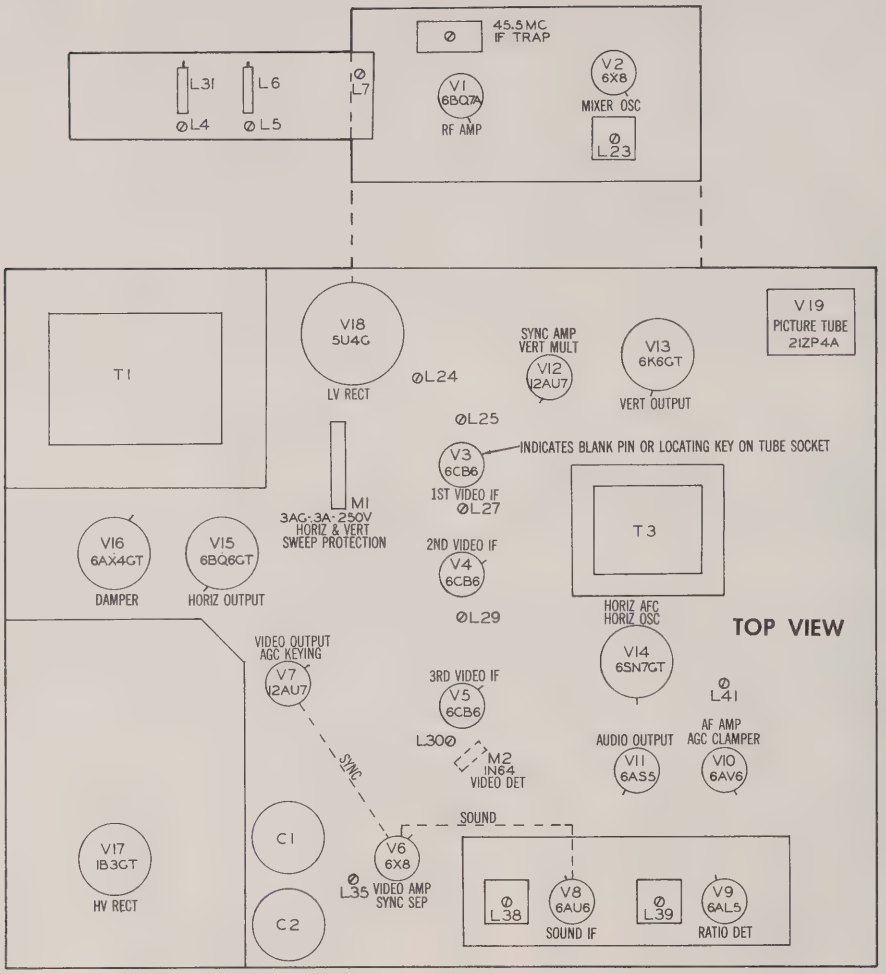
Channel No.	Frequency Band (Mc)	Video Carrier	Sound Carrier	Channel No.	Frequency Band (Mc)	Video Carrier	Sound Carrier	Channel No.	Frequency Band (Mc)	Video Carrier	Sound Carrier	Channel No.	Frequency Band (Mc)	Video Carrier	Sound Carrier
2	54-60	55.25	59.75	23	524-530	525.25	529.75	44	650-656	651.25	655.75	64	770-776	771.25	775.75
3	60-66	61.25	65.75	24	530-536	531.25	535.75	45	656-662	657.25	661.75	65	776-782	777.25	781.75
4	66-72	67.25	71.75	25	536-542	537.25	541.75	46	662-668	663.25	667.75	66	782-788	783.25	787.75
5	76-82	77.25	81.75	26	542-548	543.25	547.75	47	668-674	669.25	673.75	67	788-794	789.25	793.75
6	82-88	83.25	87.75	27	548-554	549.25	553.75	48	674-680	675.25	679.75	68	794-800	795.25	799.75
7	174-180	175.25	179.75	28	554-560	555.25	559.75	49	680-686	681.25	685.75	69	800-806	801.25	805.75
8	180-186	181.25	185.75	29	560-566	561.25	565.75	50	686-692	687.25	691.75	70	806-812	807.25	811.75
9	186-192	187.25	191.75	30	566-572	567.25	571.75	51	692-698	693.25	697.75	71	812-818	813.25	817.75
10	192-198	193.25	197.75	31	572-578	573.25	577.75	52	698-704	699.25	703.75	72	818-824	819.25	823.75
11	198-204	199.25	203.75	32	578-584	579.25	583.75	53	704-710	705.25	709.75	73	824-830	825.25	829.75
12	204-210	205.25	209.75	33	584-590	585.25	589.75	54	710-716	711.25	715.75	74	830-836	831.25	835.75
13	210-216	211.25	215.75	34	590-596	591.25	595.75	55	716-722	717.25	721.75	75	836-842	837.25	841.75
14	470-476	471.25	475.75	35	596-602	597.25	601.75	56	722-728	723.25	727.75	76	842-848	843.25	847.75
15	476-482	477.25	481.75	36	602-608	603.25	607.75	57	728-734	729.25	733.75	77	848-854	849.25	853.75
16	482-488	483.25	487.75	37	608-614	609.25	613.75	58	734-740	735.25	739.75	78	854-860	855.25	859.75
17	488-494	489.25	493.75	38	614-620	615.25	619.75	59	740-746	741.25	745.75	79	860-866	861.25	865.75
18	494-500	495.25	499.75	39	620-626	621.25	625.75	60	746-752	747.25	751.75	80	866-872	867.25	871.75
19	500-506	501.25	505.75	40	626-632	627.25	631.75	61	752-758	753.25	757.75	81	872-878	873.25	877.75
20	506-512	507.25	511.75	41	632-638	633.25	637.75	62	758-764	759.25	763.75	82	878-884	879.25	883.75
21	512-518	513.25	517.75	42	638-644	639.25	643.75	63	764-770	765.25	769.75	83	884-890	885.25	889.75
22	518-524	519.25	523.75	43	644-650	645.25	649.75								



UHF DRIVE CORD STRINGING

RCA VICTOR MODELS 21-S-501, U, 502, U, 503, U, 504, U, 505, U, 506, U, 21-S-517, U, 518, U, 519, U, 521, U, 522, U, 523, U, 525, U, 526, U, 537, U, 21-S-5022, U, 5251, U, 5252, U (Ch. KCS88B, BX, C, CX, D, DX, E, EX, J, JX, K, KX, L, LX, M, MX, V, VA, VAX, VX)

TUBE PLACEMENT CHART



TUBE FAILURE CHECK CHART

The following chart lists tubes whose failures are most likely to produce the indicated symptoms. Refer to tube placement chart for location and type of tube.

POWER SUPPLY FAILURE
No raster, no sound - **V18**

LOSS OF PICTURE OR SOUND
No pic, no sound, has raster - **V2, V3, V4, V5, V6, V11**
No pic, no sound, has snow - **V1, V2, V3**
No pic, has sound, has raster - **V6, V7, V19**
Has pic, no sound - **V8, V9, V10, V11**
Overloaded picture - **V7, V10**

SYNC FAILURE
No vert. sync - **V12, V13**
No horiz. sync - **V12, V14**
No vert. or horiz. sync - **V6, V12**

SWEEP FAILURE
No raster, has sound - **V14, V15, V16, V17, V19, Fuse (M1)**
No vertical deflection - **V12, V13**
Poor vert. linearity or foldover - **V12, V13**
Poor horiz. linearity or foldover - **V14, V15, V16**
Narrow picture - **V14, V15, V16, V17, V18**
Vert. off freq. - **V12, V13**
Horiz. off freq. - **V12, V14**

RESISTANCE MEASUREMENTS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8	Pin 9
V 1	6BQ7A	†1. 9KΩ	†500KΩ	†600KΩ	0Ω	. 1Ω	†600KΩ	270KΩ	120Ω	0Ω
V 2	6X8	0Ω	100KΩ	†12. 8KΩ	. 1Ω	0Ω	0Ω	100KΩ	†15. 8KΩ	†15. 8KΩ
V 3	6CB6	40KΩ	68Ω	0Ω	. 1Ω	◓680Ω	◓680Ω	0Ω		
V 4	6CB6	60KΩ	◓18Ω	0Ω	. 1Ω	†700Ω	†700Ω	INF		
V 5	6CB6	. 2Ω	180Ω	. 1Ω	0Ω	▲470Ω	▲470Ω	0Ω		
V 6	6X8	0Ω	2. 4Meg	▲1. 2Meg	0Ω	. 1Ω	120Ω	3. 9KΩ	▲4. 7KΩ	▲16. 7KΩ
V 7	12AU7	250KΩ	▲20KΩ	▲0Ω	. 1Ω	. 1Ω	†7. 5KΩ	470KΩ	3KΩ	0Ω
V 8	6AU6	47KΩ	0Ω	0Ω	. 1Ω	▲1KΩ	▲1KΩ	120Ω		
V 9	6AL5	INF	INF	. 1Ω	0Ω	10KΩ	0Ω	10KΩ		
V 10	6AV6	10Meg	0Ω	. 1Ω	0Ω	250KΩ	250KΩ	†330KΩ		
V 11	6AS5	15KΩ	400KΩ	. 1Ω	0Ω	400KΩ	†500Ω	†900Ω		
V 12	12AU7	▲15KΩ	33KΩ	1. 2KΩ	. 1Ω	. 1Ω	■1. 8Meg	1. 8Meg	0Ω	0Ω
V 13	6K6GT	INF	0Ω	†550Ω	†40Ω	1. 5Meg	INF	. 1Ω	0Ω	
V 14	6SN7GT	1. 5Meg	†38Ω	230KΩ	250KΩ	†42KΩ	0Ω	. 1Ω	0Ω	
V 15	6BQ6GT	INF	. 1Ω	100Ω	†12KΩ	1Meg	INF	0Ω	100Ω	Top Cap ■21Ω
V 16	6AX4GT	INF	INF	900KΩ	INF	†40Ω	INF	. 1Ω	0Ω	
V 17	1B3GT		PINS	1 - 8	HAVE	INFINITE RESISTANCE				Top Cap ■400Ω
V 18	5U4G	INF	40KΩ	INF	27Ω	INF	25Ω	INF	40KΩ	
V 19	21ZP4A	0Ω	470KΩ	Pin 10 ■350KΩ	Pin 11 †250KΩ	Pin 12 . 1Ω				

† MEASURED FROM PIN 2 OF V18.
▲ MEASURED FROM 120V LINE.
◓ MEASURED FROM PIN 7 OF V4.
■ MEASURED FROM PIN 3 OF V16.

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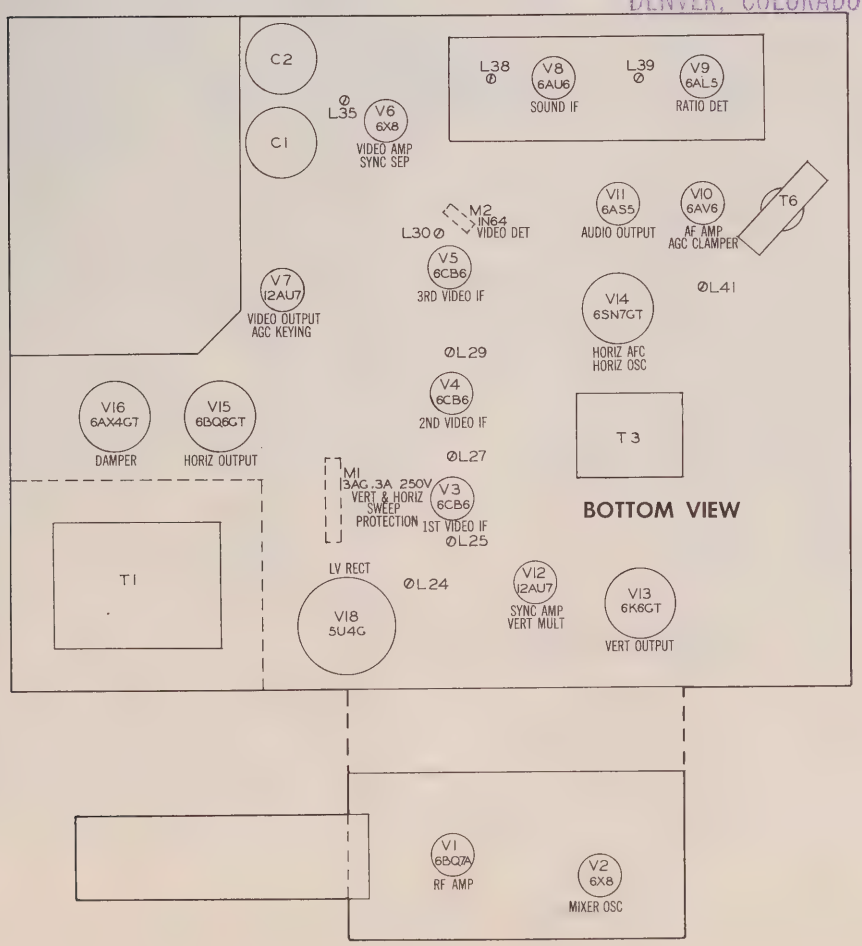
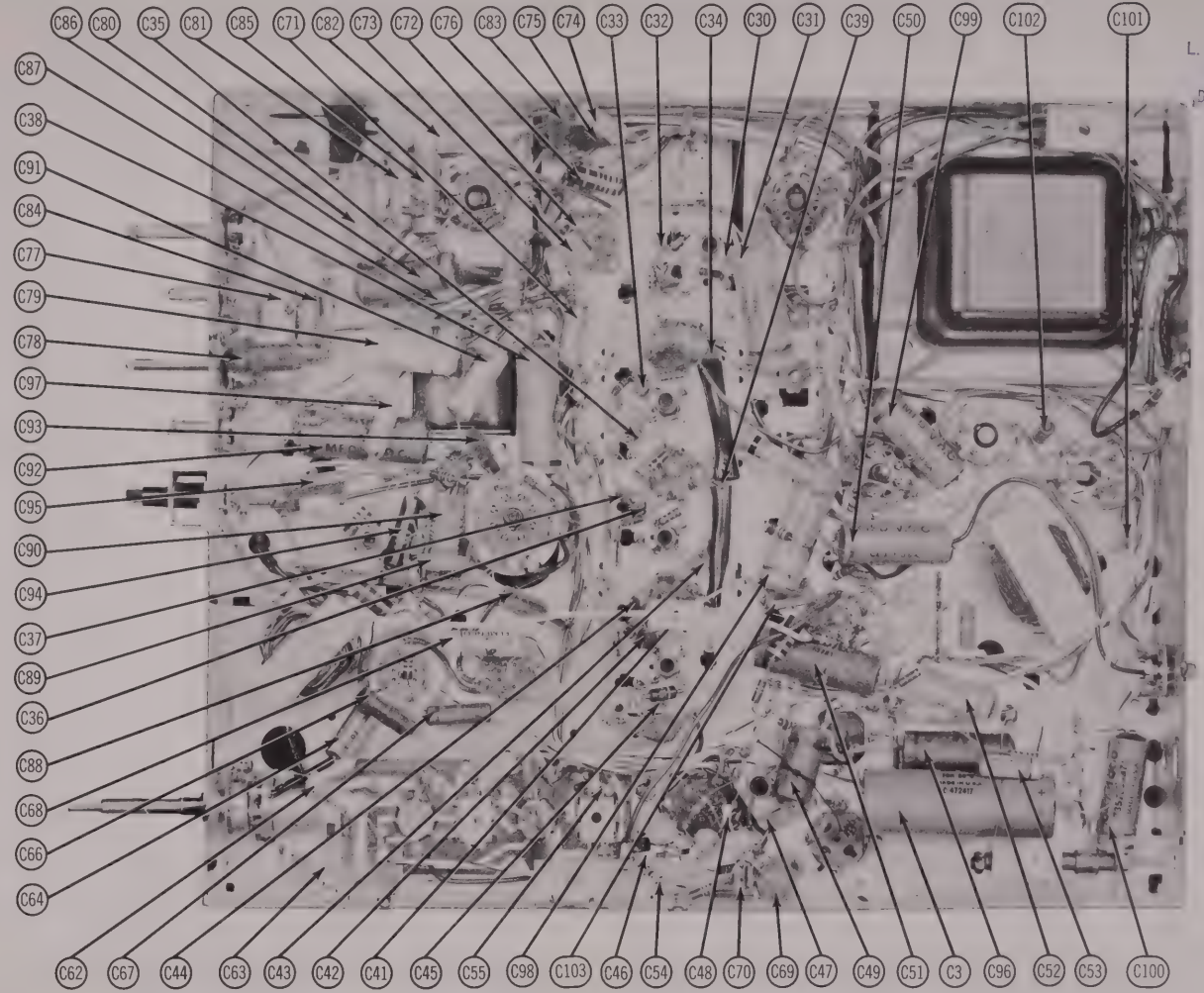


TUBE PLACEMENT CHART

SET 272 FOLDER 11

RCA VICTOR MODELS 21-S-501, U, 502, U, 503, U, 504, U, 505, U, 506, U, 21-S-517, U, 518, U, 519, U, 521, U, 522, U, 523, U, 525, U, 526, U, 537, U, 21-S-5022, U, 5251, U, 5252, U (Ch. KCS88B, BX, C, CX, D, DX, E, EX, J, JX, K, KX, L, LX, M, MX, V, VA, VI ., VX)



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CHASSIS BOTTOM VIEW-CAPACITOR IDENTIFICATION

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ALTERNATE TUNER SCHEMATIC

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RF AMP 6BQ7A
MIXER OSC 6X8
UHF OSC 6AF4
FINE TUNING
UHF - VHF TUNER KRK 30 USED WITH CHASSIS KCS 88J, JX, K, KX, L, LX, M, MX, V, VX, VA, VAX
A PHOTOFACT STANDARD NOTATION SCHEMATIC
© Howard W. Sams & Co., Inc. 1955
WHEN USING COMBINATION UHF-VHF ANTENNA, CONNECT ANTENNA LEAD-IN TO VHF TERMINALS. WHEN USING SEPARATE UHF-VHF ANTENNAS, UNSOLDER THE GROUNDING LINK AND CONNECT ANTENNA LEAD-IN WIRES TO THEIR RESPECTIVE TERMINALS.
TO VHF ANT
TO UHF ANT
UHF TRANSMISSION LINE

TROUBLE SHOOTING AIDS

SWEEP

HORIZONTAL

LOSS OF SWEEP

Follow procedure outlined under "Loss of High Voltage".

INSUFFICIENT SWEEP

Check by substitution V15, V16 and V18. Check adjustments B2 and B3. Check C95, C97, R104, T2, T4A and other associated components.

DRIVE LINES

Check by substitution V15 and V16. Check adjustment B2. Check C95, R104, R103, T2 and other associated components.

COMPRESSED LEFT SIDE

Check by substitution V15 and V16. Check horizontal output and damper stages for component failure or change of value.

FOLDS

Follow procedure outlined under "Drive Lines".

PIE CRUST EFFECT

Check by substitution V14, V15 and V16. Check C92, C91, R92 for open. Check L40, L41, C93 and other associated components.

XMAS TREE EFFECT

Check by substitution V14, V15 and V16. Check T2 and T4 for internal arcing. Check C93, C94, C95, R98, R103 and other associated components.

VERTICAL

LOSS OF SWEEP

Check by substitution V12 and V13. Check waveform W8.

If Satisfactory	If Unsatisfactory
Check T3, T4B, C85, C87 and other associated components.	Check C75, C76, C78, C84, R87, R78 and other associated components.

INSUFFICIENT SWEEP

Check by substitution V12 and V13. Check height and vertical linearity controls for proper operation. Check T3, T4B, R78, R87, R105 and other associated components.

COMPRESSED AT BOTTOM

Check by substitution V12 and V13. Check R105, R2, R78, C84 and other associated components.

COMPRESSED AT TOP

Check by substitution V12 and V13. Check R87, R4, C84, C78, T3 and other associated components.

FOLDS

Check by substitution V12 and V13. Check C78, C80, C84, R81, R87 and other associated components.

SYNC

LOSS OF VERTICAL AND HORIZONTAL SYNC

Check by substitution V6 and V12. Check C69, C71, R66, R70, R69, R75, R74 and other associated components.

LOSS OF VERTICAL SYNC-HORIZONTAL SYNC SATISFACTORY

Substitute V12. Check C75, C76, R5, R87 and other associated components.

LOSS OF HORIZONTAL SYNC-VERTICAL SYNC SATISFACTORY

Substitute V14. Check C88, C90, C89 and check other components associated with V14.

HORIZONTAL BENDING

Check by substitution V6, V7, V12 and V14. Check components associated with V14.

VIDEO

LOSS OF VIDEO

Check by substitution V6 and V7. Check C49, C50, R38, R43, L36, L37, L33, L34 and other associated components.

SOUND BARS (4.5MC BEAT)

Adjust tuner fine tuning for best sound and picture. Check adjustment A50. Check video IF alignment.

POOR CONTRAST

Check by substitution V6 and V7. Check contrast control. Check video crystal detector. Check picture tube. Check L33, L34, L37, C49, C50 and other associated components.

NEGATIVE PICTURE

Check by substitution V6 and V7. Check picture tube. Check video crystal detector. Check C49, C50 and other associated components.

SMEAR

Check by substitution V6 and V7. Check L32, L33, L34, L37, C49, C50 and other associated components. Check video IF alignment.

WIDE BLACK BAR ACROSS PICTURE

Check by substitution V1, V3, V4, V5, V6 and V7 for heater to cathode leakage.

AUDIO

WEAK OR NO SOUND

Check by substitution V8, V9, V10 and V11. Check stages V10 and V11 using audio signal generator. Apply audio signal across R1B.

If Satisfactory	If Unsatisfactory
Check ratio detector and audio IF stages for component failure or change of value.	Check C62, C64, C67, C68, C3, R65, R62, T6, speaker and other associated components.

BUZZ

Adjust tuner fine tuning for best sound and picture. Check adjustment A47. If still unsatisfactory, check audio IF alignment.

DISTORTED

Follow procedure outlined under "Weak or No Sound".

POWER

DEAD SET

If filaments fail to light, check AC interlock assembly. Check switch on volume control and T1. If filaments light, check TV-phono switch for TV position. Substitute V18. Check B+ filter and decoupling network.

SMALL AND/OR DIM PICTURE

Substitute V18. Check B+ filter and decoupling network.

TROUBLE SHOOTING AIDS (cont)

HIGH VOLTAGE

LOSS OF HIGH VOLTAGE

Check by substitution V14, V15, V16 and V17. Check M1 fuse. Check waveform W13.

If Satisfactory	If Unsatisfactory
Check T2, T4A, T5, C102, C103, C100, C101, C99, C98, R104 and other associated components.	Check C93, C94, C95, R99, R98, L40, L41 and other associated components.

INSUFFICIENT HIGH VOLTAGE

Check by substitution V15, V16 and V18. Check T2, T4A, C95, R104 and other associated components.

BLOOMING

Check by substitution V15, V16, V17 and V18. Check C100, C95, R104, R103 and other associated components.

GENERAL

RASTER, SOUND, NO PICTURE

Follow procedure outlined under "Loss of Video".

RASTER, PICTURE, NO SOUND

Follow procedure outlined under "Weak or No Sound".

RASTER, NO SOUND, NO PICTURE

Check by substitution V1, V2, V3, V4, V5, V6 and V7. Check video IF components for failure or change of value.

NO RASTER, NO SOUND

Follow procedure outlined under "Dead Set".

KEYSTONE EFFECT

Check T4 and its associated components.

INTERMITTENT STREAKS

Check high voltage section for corona discharge and arcing.

Symptoms shown are assumed and are not indicative of the quality and workmanship of this equipment.

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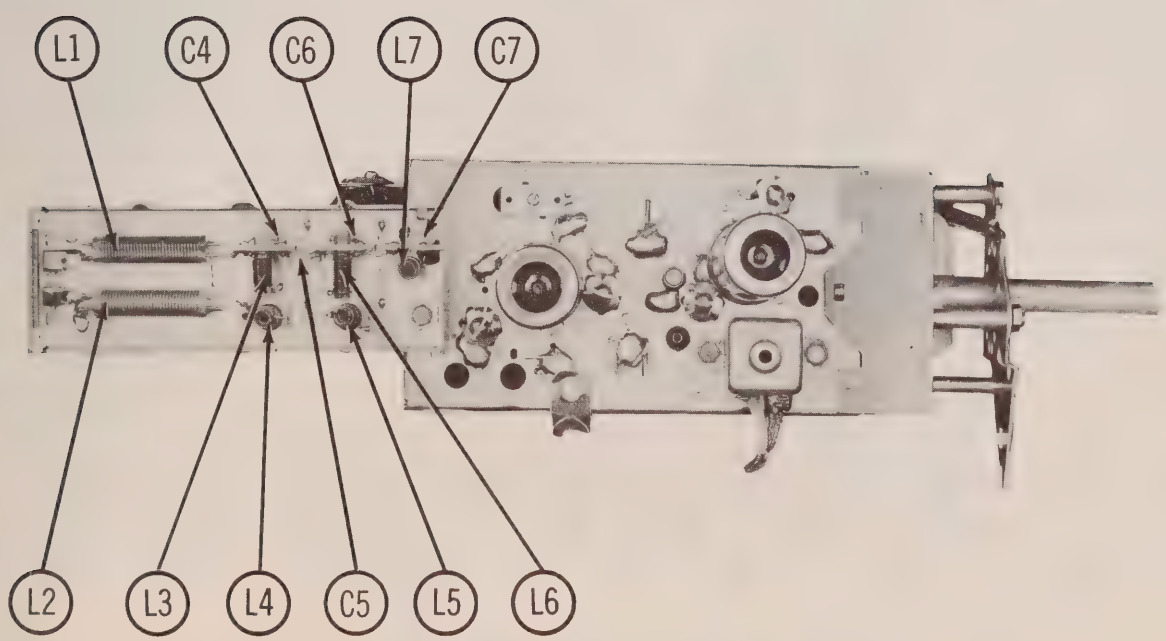
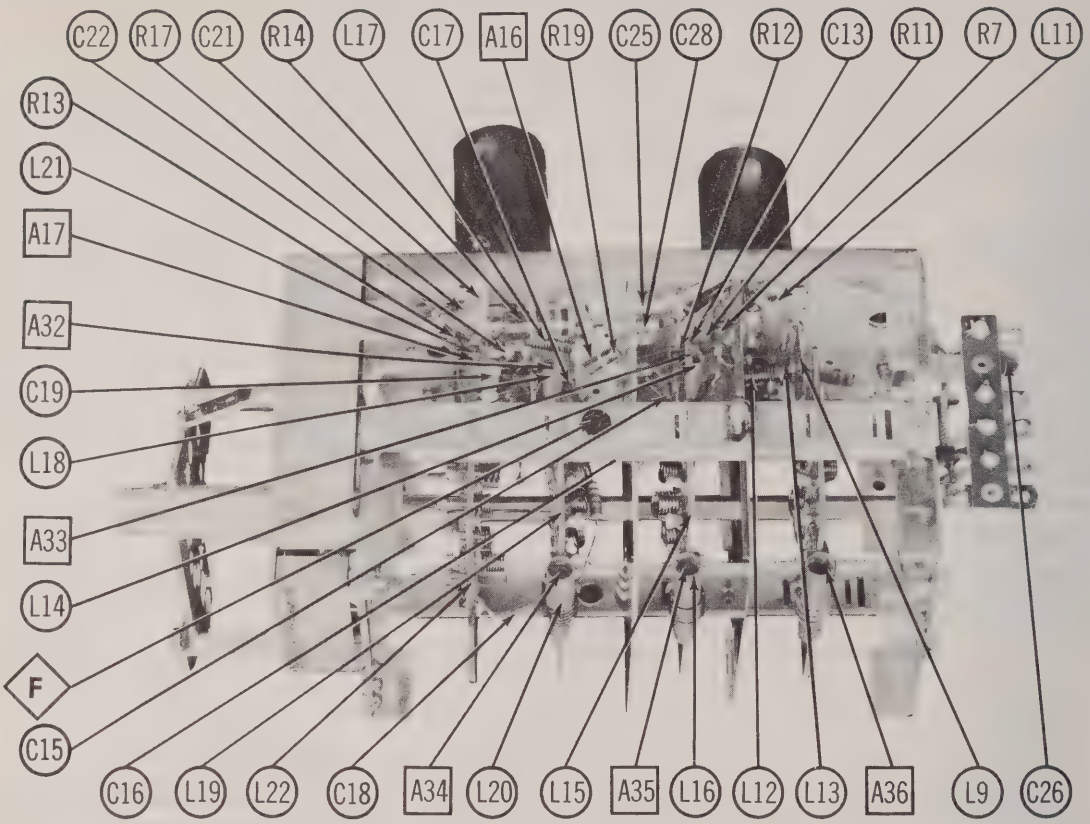
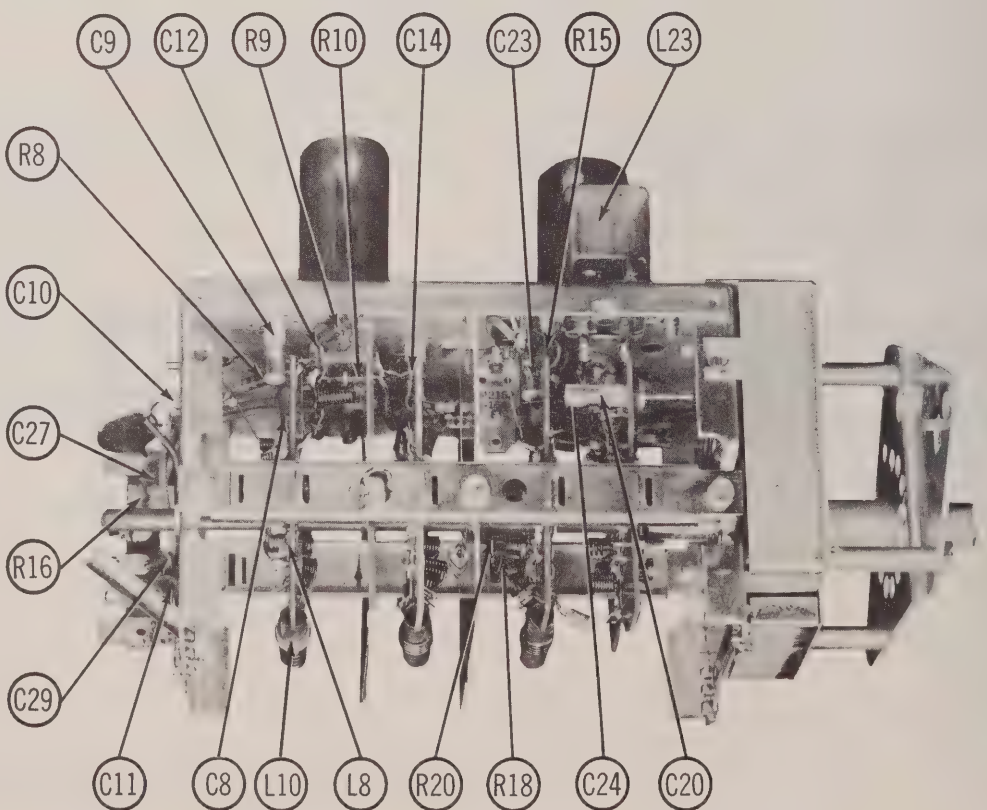


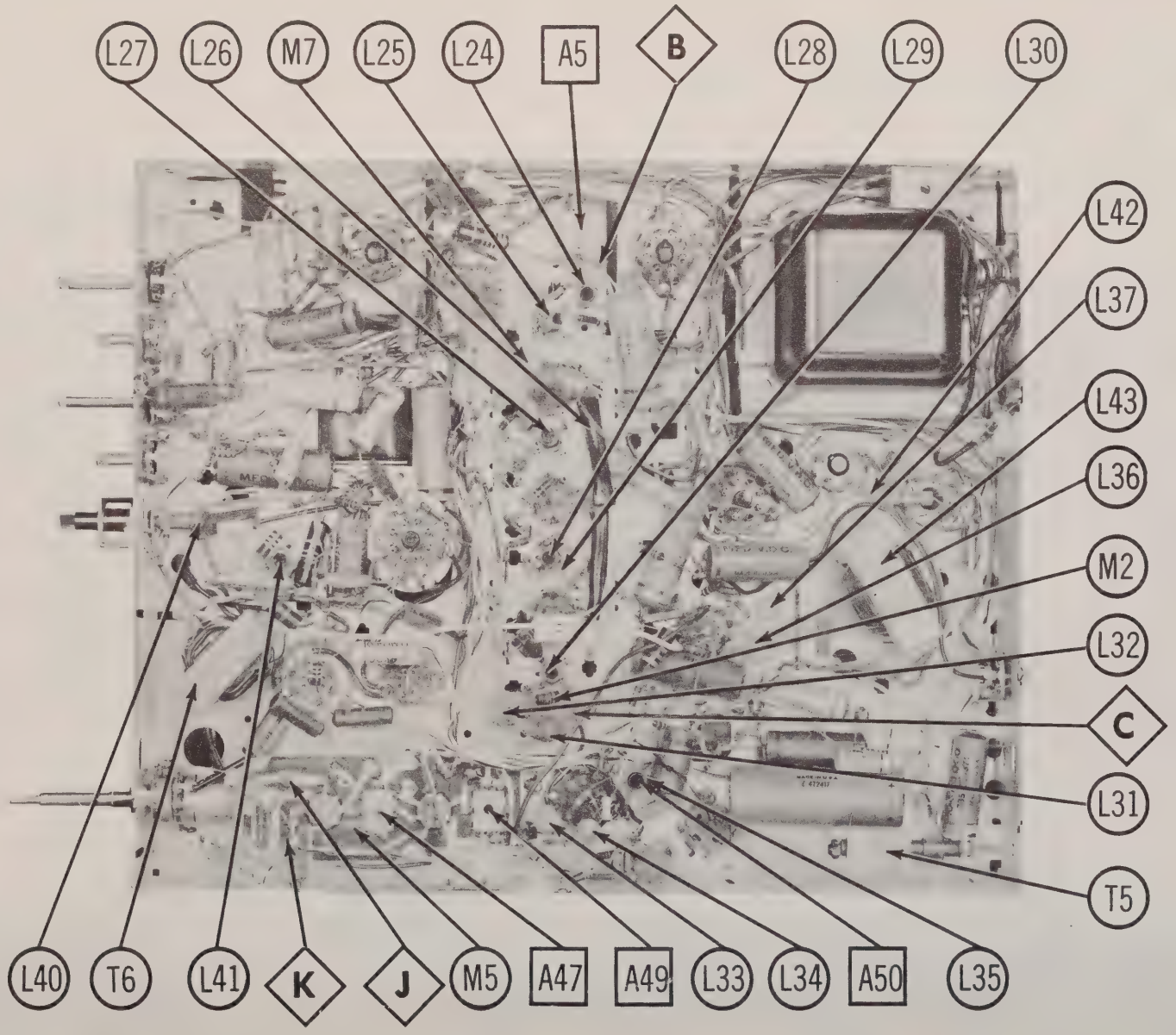
RF TUNER TOP VIEW



RF TUNER-RIGHT SIDE



RF TUNER-LEFT SIDE



CHASSIS BOTTOM VIEW-TRANS., INDUCTOR AND ALIGNMENT IDENTIFICATION

PARTS LIST AND DESCRIPTIONS

TUBES (SYLVANIA, GENERAL ELECTRIC, WESTINGHOUSE)

ITEM No.	USE	REPLACEMENT DATA		RETMA BASE TYPE	NOTES
		RCA Victor PART No.	STANDARD REPLACEMENT		
V1	RF Amp.	6BQ7A	6BQ7A	9AJ	
V2	Mixer-Osc.	6X8	6X8	9AK	
V3	1st Video IF Amp.	6CB6	6CB6	7CM	
V4	2nd Video IF Amp.	6CB6	6CB6	7CM	
V5	3rd Video IF Amp.	6CB6	6CB6	7CM	
V6	Video Amp. - Sync Sep.	6X8	6X8	9AK	
V7	Video Output-AGC Keying	12AU7	12AU7	9A	
V8	Sound IF Amp.	6AU6	6AU6	7BK	
V9	Ratio Det.	6AL5	6AL5	6BT	
V10	AF Amp. - AGC Clamper	6AV6	6AV6	7BT	
V11	Audio Output	6AS5	6AS5	7CV	
V12	Sync Amp. - Vert. Mult.	12AU7	12AU7	9A	
V13	Vert. Mult. - Vert. Output	6K6GT	6K6GT	7S	
V14	Horiz. AFC - Horiz. Osc.	6SN7GT	6SN7GT	8BD	
V15	Horiz. Output	6BQ6GT	6BQ6GT	6AM	
V16	Damper	6AX4GT	6AX4GT	4CG	
V17	HV Rectifier	1B3GT	1B3GT	3C	
V18	LV Rectifier	5U4G	5U4G	5T	

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CATHODE-RAY TUBE

ITEM No.	REPLACEMENT DATA					RETMA BASE TYPE	NOTES
	RCA Victor PART No.	CBS-HYTRON PART No.	GENERAL ELECTRIC PART No.	SYLVANIA PART No.	WESTINGHOUSE PART No.		
V19	21ZP4A	21ZP4A 21ZP4B	21ZP4A 21ZP4B	21ZP4A 21ZP4B 21ZP4 ①	21ZP4A 21ZP4B	12N 12N 12D	① Circuit changes necessary.

CAPACITORS

Capacity values given in the rating column are in mfd. for Electrolytic and Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING		REPLACEMENT DATA						NOTES
	CAP.	VOLT	RCA Victor PART No.	CENTRALAB PART No.	ERIE PART No.	MALLORY PART No.	PYRAMID PART No.	SANGAMO PART No.	
C1A	▲80	400	79147			FP375.5	TM-3063	Q-065	
B	▲80	200							
C2A	▲100	400	79146			FP389.1	TM-4105	Q-410	
B	▲30	50							
C3	100	250	79314			FP129.1	TD-100-450	PL-30100	
C4	18			D6-180	GP1K-180	UC-5418			
C5	5			D6-050	GP1K-050	ZT-555			
C6	27			D6-270	GP1K-270	UC-5427			
C7	33			TCZ-33	NP0K-180				
C8	270		75199	D6-271	GP2K-271	UC-5327			
C9	1-4		76532	829-10	3115-01-10	CT-551			
C10	1000		77084	MFT-1000					
C11	470		77293	DD-471	801-00047	UC-5347			
C12	1000		77252	DD-102	801-001	DC-521			
C13	1000		77252	DD-102	801-001	DC-521			
C14	1-4		76532	829-10	3115-01-10	CT-551			
C15	270		75199	D6-271	GP2K-271	UC-5327			
C16	270		75199	D6-271	GP2K-271	UC-5327			
C17	470		75198	D6-471	GP2K-471	UC-5347			
C18	.68		71504						
C19	10		77865	TCZ-10	NP0K-100	ZT-541			
C20	.8-3		77913	829-3		CT-565A			
C21	.8-3		77151	829-3		CT-565A			
C22	10		33098	TCN-10	N750K-100	NT-541			
C23	.8-3		77151	829-3		CT-565A			
C24	1000		77252	DD-102	801-001	DC-521			
C25	1000		77084	MFT-1000					
C26	10000		73960	DD-103	811-01	DC-511			
C27	470		77293	DD-471	GP2K-471	UC-5347			
C28	1000		77084	MFT-1000					
C29	470		77293	DD-471	GP2K-471	UC-5347			
C39	15		39044	D6-150	GP1K-150	UC-5315			
C31	.47	200	73787			PT4047	IMP2-P47	3302047	
C32	470		77293	DD-471	801-00047	UC-5347			
C33	470			DD-471	801-00047	UC-5347			
C34	1000			DD-102	801-001	DC-521			
C35	470			DD-471	801-00047	UC-5347			
C36	470			DD-471	801-00047	UC-5347			
C37	1000			DD-102	801-001	DC-521			
C38	.39	200	79318					3306039	
C39	1000			DD-102	801-001	DC-521			
C40	470			DD-471	801-00047	UC-5347			Note 4
C41	7								Note 1
C42	1000			DD-102	801-001	DC-521			
C43A	1000			DD3-102	812-001	DCD-521			
B	1000								
C44	470			DD-471	801-00047	UC-5347		K-1347	
C45	10		33098						
C46	47		39042	D6-470	GP1K-470	UC-5447		K-1447	
C47	.0039	400	79018						
C48	6		77364						
C49	.1	600	79149	DF-104		PT601	IMP6-P1	330601	
C50	.1	600	73557	DF-104		PT601	IMP6-P1	330601	
C51	.33	200	76994			PT403		3306033	
C52	.047	600	73592	DF-503		PT6147	IMP6-S47	3306147	
C53	.0022	600	73595	D6-222	GP2-333-222	PT6222	IMP6-D22	3306222	
C54	100		39396						
C55	3		76507						
C56	39								
C57	56								
C58	1000			DD-102	801-001	DC-521		K-1210	
C59	.47	200				PT4047	IMP2-P47	3302047	
C60	1000	500				MCE235		KR-1210	

PROPERTY OF
L. F BLANKENSHIP
3924 MEADE ST.
DENVER, COLORADO

PARTS LIST AND DESCRIPTIONS (Continued)

CAPACITORS (cont)

ITEM No.	RATING CAP	RATING VOLT	REPLACEMENT DATA RCA Victor PART No.	CENTRALAB PART No.	ERIE PART No.	MALLORY PART No.	PYRAMID PART No.	SANGAMO PART No.	NOTES
C61	.0033	400		D6-332	GP2-333-332	PT4233	IMPE-D33	3302S33	
C62	.0047	400	79014	D6-472	GP2-333-472	PT4247	IMPE-D47	3302S47	Note 2
C63	.01	200	79316	D6-103	GP2-333-103	PT431	IMPE-S1	330431	Note 3
C64	.01	200	79014	D6-103	GP2-333-103	PT431	IMPE-S1	330431	
C65	.0027	600	73599	D6-272	GP2-333-272			C-1327	Note 4
C66	.0047	600	73599	D6-472	GP2-333-472	PT521	IMPE-D5	330521	Note 5
C67	.0027	600	73599	D6-272	GP2-333-272			C-1327	Note 6
C68	.0082	1000	78979						
C69	.1	400	73551	DF-104		PT40I	IMPE-P1	330401	
C70	330	500	39860			MCE341		KR-1323	
C71	.033	400	73552			PT4133	IMPE-S3	330133	
C72	470		78622	DD-471	831-471	UC-5347		K-1347	
C73	330	500	59271					KR-1322	
C74	.0082	400	79019						
C75	.0033	400	79315					CR-1233	
C76	.0039	600	16321					CR-1339	
C77	.1	400	73551	DF-104		PT40I	IMPE-P1	330401	
C78	.01	600	73594						
C79	.056	600	78317						
C80	.068	300	79016			PT4168	IMPE-S68	330168	
C81	.022	600	73799						
C82	.015	400	73797						
C83	.0022	600	73595	D6-223	GP2-333-223	PT6223	IMPE-D22	3306222	
C84	.033	600	73798			PT6233	IMPE-S22	3306233	
C85	.001	1800	76980			PT631	CT16-DA	3116-.001	
C86	.1	400	73551	DF-104		PT40I	IMPE-P1	330401	
C87	.022	600	73798			PT6123	IMPE-S23	3306123	
C88	68	500	78474	TCZ-68	MP0L-680			KR-1468	
C89	68	500	78475	TCZ-68	MP0L-680			KR-1468	
C90	.1	400	73551	DF-104		PT40I	IMPE-P1	330401	
C91	.022	600	73963			PT4123	IMPE-S23	3304123	
C92	.47	300	73787			PT4047	IMPE2-P47	3303047	
C93	330	500	78478			MCE341		KR-1333	
C94	.01	600	73594						
C95	470	500	59967			MCE345		KR-1347	
C96	.1	400	73557	DF-104		PT40I	IMPE-P1	330401	
C97	.0012	600	76995					CR-1212	
C98	.27	300	73786						
C99	.1	600	73557	DF-104		PT60I	IMPE-P1	330601	
C100	.047	1000	73597						
C101	270	500	79023			MCE340		KR-1327	
C103	130		79323	D6-131	GP1K-131	UC-5123			
C105	330	500	78476			MCE341		KR-1333	
C104	.01								

Note 1: Chassis not using printed circuit 79479 uses a 91MMF in this application.
Note 2: Chassis KCS-88D, L, V, VA use a .0027MFD ④ 600V in this application. Other chassis may use .01MFD.
Note 3: Chassis KCS-88D, L, V, VA use a .015MFD ④ 200V in this application.
Note 4: Not used in some versions.
Note 5: Chassis KCS-88D, E, D, L, M, V and VA use a 270MMF in this application.
Note 6: Some versions use a .0018MFD in this application.

CONTROLS

ITEM No.	RATING RESISTANCE	RATING WATTS	REPLACEMENT DATA RCA Victor PART No.	IRC PART No.	CLAROSTAT PART No.	CENTRALAB PART No.	MALLORY PART No.	INSTALLATION NOTES
R1A	10KΩ	½	78306	*QJ-504	RTV-443	F1-25	UF14L)	Contrast - Panel
B	1Meg	½				R2-57	UN16-7254)	Volume tapped at 250KΩ - Rear
C	Switch					KB-1	UB-58	Attach to R1B
R2A	3.5Meg	½	78805	B11-161	A47-4Meg-S	AB-86	S1-58	Height
B	Shaft		Not Req.	TM-3K1T	KS8-3	AK-1	Not Req.	Attach to R2A
R3A	200KΩ	½	79139	Q11-129	A47-200K-S	B-68	U-43	Brightness
B	Shaft		Not Req.	Not Req.	KS-3	Not Req.	Not Req.	Attach to R3A
R4A	2.5Meg	½	78807	B11-239	A47-2.5Meg-S	AB-83	SU-585	Vert. Linearity
B	Shaft		Not Req.	TM-2K1T	FKS-1/4	AK-1	Not Req.	Attach to R4A
R5A	1.5Meg	½	78210	B11-158	A47-2Meg-S	AB-75	U-155	Vert. Hold
B	Shaft		Not Req.	Not Req.	KS8-3	AK-4	Not Req.	Attach to R5A
R6A	500KΩ	½	78808	B11-153	A47-500K-S	AB-89	SU-50	VSC
B	Shaft		Not Req.	TM-2K1T	FKS-1/4	AK-1	Not Req.	Attach to R6A

* CONCENTRIKIT EQUIVALENT KIT K-2, BASE ELEMENTS & SHAFTS, B11-116 & P1-200 (PANEL)
B13-137X & B1-316 (REAR)
76-1 SWITCH

† Universal Replacement (Mallory exact duplicate part no. UK7752)

RESISTORS

ITEM No.	RATING OHMS	RATING WATT	REPLACEMENT DATA RCA Victor PART No.	IRC PART No.	NOTES
R7	1Meg	½	503510	BTS-1Meg	
R8	680Ω	½	504288	BTS-680	
R9	120Ω	½	504410	BTS-120	
R10	100KΩ	½	504410	BTS-100K	
R11	1Meg	½	503510	BTS-1Meg	
R12	100Ω	½	502210	BTS-100	
R13	100KΩ	½	504410	BTS-100K	
R14	33KΩ	2	523312	BTB-33K	
R15	15KΩ	2	523315	BTB-15K	
R16	82ΩΩ	2	502182	BTB-820	
R17	10KΩ	2	503112	BTB-10K	
R18	3300Ω	2	502233	BTB-3300	
R19	100KΩ	½	504410	BTS-100K	
R20	100KΩ	½	502410	BTS-100K	
R21	1000Ω	½	504210	BTS-1000	
R22	150KΩ 5%	½	502415	BTS-150K 5%	
R23	1090Ω	½	504210	BTS-1000	
R24	33KΩ 5%	½	502333	BTS-33K 5%	
R25	15KΩ	½	503315	BTS-15K	
R26	68Ω	½		BTS-68	
R27	680Ω	½		BTS-680	
R28	56KΩ 5%	½		BTS-56K 5%	Note 1
R29	150KΩ 5%	½	502415	BTS-150K 5%	
R30	150KΩ	½		BTS-150K	
R31	18Ω	½		BTS-18	
R32	680Ω	½		BTS-680	
R33	56KΩ 5%	½		BTS-56K 5%	Note 1
R34	180Ω	½		BTS-180	
R35	4700	½		BTS-470	
R36	3900Ω 5%	½	502239	BTS-3900 5%	
R37	120Ω	½	503113	BTS-120	
R38	4700Ω	½	503247	BTS-4700	
R39	12KΩ	1	513312	BTA-12K	
R40	15KΩ	2	523315	BTB-15K	
R41	470KΩ	½	504447	BTS-470K	
R42	820Ω	½	503182	BTS-820	
R43	7960Ω 5%	½	46641	BTA-7960 5%	
R44	470KΩ	½	504447	BTS-470K	
R45	150KΩ	½	504415	BTS-150K	
R46	220KΩ	½	503422	BTS-220K	
R47	33KΩ	½	503333	BTS-33K	
R48	33KΩ	½	503333	BTS-33K	
R49	56KΩ	½		BTS-56K	Note 2
R50	47KΩ	½	503347	BTS-47K	
R51	47KΩ	3		BTB-47K	
R52	120KΩ 5%	½	30180	BTS-120K 5%	
R53	1.5Meg 5%	½	502518	BTS-1.5Meg 5%	

RESISTORS (cont)

ITEM No.	RATING OHMS	RATING WATT	REPLACEMENT DATA RCA Victor PART No.	IRC PART No.	NOTES
R54	470Ω	½		BTS-470	
R55	120Ω	½		BTS-120	
R56	1000Ω	½		BTS-1000	
R57	39KΩ	½		BTS-39K	
R58	10KΩ	½		BTS-10K	
R59	10KΩ	½		BTS-10K	
R60	33KΩ	½	503333	BTS-33K	
R61	10Meg	½	504610	BTS-10Meg	
R62	330KΩ	½	504433	BTS-330K	
R63	820KΩ 5%	½	502482	BTS-820K 5%	
R64	1Meg 5%	½	502510	BTS-1Meg 5%	
R65	470Ω	2	52A167	BTS-470	
R66	18KΩ	½	503318	BTS-18K	
R67	180KΩ	½	503418	BTS-180K	
R68	2.2Meg	½	503522	BTS-2.2Meg	
R69	39KΩ	½	503339	BTS-39K	
R70	1.2Meg	½	503512	BTS-1.2Meg	
R71	33KΩ	½	503333	BTS-33K	
R72	390KΩ	½	503439	BTS-390K	
R73	1200Ω	½	502212	BTS-1200	
R74	10KΩ	½	513310	BTA-10K	
R75	3900Ω 5%	½	502239	BTS-3900 5%	
R76	22KΩ	½	503322	BTS-22K	
R77	18KΩ	½	503318	BTS-18K	
R78	470KΩ	½	503447	BTS-470K	
R79	22KΩ	½	503222	BTS-22K	
R80	18KΩ 5%	½	3219	BTS-18K 5%	
R81	390KΩ	½	503439	BTS-390K	

Note 1: Use in chassis having printed circuit 77479 only.
Note 2: Some versions may use a 82KΩ resistor in this application.

TRANSFORMER (POWER)

ITEM No.	RATING PRI	RATING SEC 1	RATING SEC 2	RCA Victor PART No.	REPLACEMENT DATA Stancor PART No.	Merit PART No.	RCA TYPE No	Halldorson PART No.	Thordarson PART No.
T1	117VAC ②1.5A	556VCT .120ADC	5VAC ③3A	79162	P-8184 ①	P-3077	R-61BC	P9733 ①	
	SEC 3	SEC 4	SEC 5						
	6.3VAC ②8.7A								

① Drill new mounting holes.
② Parallel and phase 6.3V for Sec. #3. Taps 6.3V ②1.2A winding.

TRANSFORMERS (SWEEP CIRCUITS)

ITEM No.	USE	REPLACEMENT DATA RCA Victor PART No.	Halldorson PART No.	Merit PART No.	RCA TYPE No	Ram PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.
T2	Horiz. Output Trans.	79145	F3411 ①	HV0-9* ②		X0B9* ②	A-8233* ③	F1Y-24* ②	D-10* ②
T3	Vert. Output Trans.	78643	Z1803 ② ④	A-3036 ③ ④		V30T2 ② ④	A-8145 ② ③	R8T3 ④	A-8X ② ④
T4A	Yoke-Horiz. (13.5MH) Vert.(39MH)	77597 ② ④ 79510 ③ ④	DF602 ③	MDF-72 ③		T70F14/43 ④	DY-8A ③	Y-71 ④	Y-17-1 ③
T5	Width Coil (2, 7-17MΩ)	79144	RF800 ③ ④	MWC-6 ③ ④		201R16	WC-8	WC-18 ⑩	WC-12 ③ ④

① Drill new mounting hole(s).
② Connect as auto trans.
③ Use original mounting bracket.
④ Used in all models except 21-S-523, U.
⑤ Includes: 6 contact male connectors, RCA part no. 76542
resistors R88, R89, R107
capacitor C104
⑥ Deflection yoke for models 21-S-523, U.
⑦ Remove damping capacitor from terms #1 and #2. Use original horiz. yoke damping network if necessary.
⑧ Connect horiz. yoke damping network across terms #3 and #7. Use original network if necessary.
⑨ Enlarge mounting hole.
⑩ Connect to coded red and blue terms.
⑪ Connect to terms #1 and #2.

*HORIZONTAL OUTPUT TRANSFORMER CONNECTION DATA

Use Original Width Coil Unless Replacement Type Is Listed

ORIGINAL TERMINAL CONNECTIONS	Halldorson Replacement Connections	Merit Replacement Connections	RCA Replacement Connections	Ram Replacement Connections	Stancor Replacement Connections	Thordarson Replacement Connections	Triad Replacement Connections
5	9	9	9	7	9	9	9
				Jumper			Jumper
4	8	8	8	7 & 8	8	8	7 & 8
3	5	5	5 or 4	5	5	5	5
2	3	3	3	4	3	3	3
1	1	1	1	3	1	1	1
Connect Width Coil Across	2 & 1	3 & 1	3 & 1	3 & 1	4 & 3	3 & 1	3 & 1

TRANSFORMER (AUDIO OUTPUT)

ITEM No.	IMPEDANCE PRI	IMPEDANCE SEC	REPLACEMENT DATA RCA Victor PART No.	Stancor PART No.	Merit PART No.	Triad PART No.	Halldorson PART No.	Thordarson PART No.	NOTES
T6	4.3KΩ	3.3Ω	79159 ② 79476 ③	A-3852	A-3018	S-5X	Z1002	28S60 ①	① Drill one new mounting hole. ② Used in chassis KCS84B, BX, C, CX, J, JX, K and KX. ③ Used in chassis KCS88D, DX, E, EX, L, LX, M, MX, V, VA, VAX and VX.

SPEAKER

ITEM No.	RATINGS SIZE	RATINGS FIELD	RATINGS V	RATINGS C	RATINGS IMP	REPLACEMENT DATA RCA Victor PART No.	JENSEN PART No.	QUAM PART No.	NOTES
SP1	5"	PM	3	3Ω		77000	5T-105 Mod. P4-X	5A1	Ch. KCS84B, BX, C, CX, J, JX, K, KX use one 5" speaker or one 8" speaker.
	8"	PM	3	3Ω		74664	8T-115 Mod. P8-V	8A31	Ch. KCS88D, DX, L, LX, V, VA, VAX use two 5" speakers. Ch. KCS88, EX, M, MX use one 8" speaker and two 5" speakers.

COILS (RF-IF)

ITEM No.	USE	DC RES. PRI	DC RES. SEC	REPLACEMENT DATA RCA Victor PART No.	MEISSNER PART No.	MERIT PART No.	MILLER PART No.	NOTES
L1	Ant. Matching Trans.	.8Ω		78296				Note 1
L2	Ant. Matching Trans.	.8Ω	.8Ω	78296				Note 1
L3	IF Trap	9Ω		78296				Note 1
L4	Ant. Shunt Coil	0Ω		78296				Note 1
L5	Ant. Shunt Coil	0Ω		78296				Note 1
L6	IF Trap	0Ω		78296				Note 1
L7	FM Trap	0Ω		78296				Note 1
L8	Ant. Coils	0Ω		78802				Includes stator complete with rotor, coils (Also L9, L10) Channel 13 - part of complete assembly
L9	Ant. Coil	0Ω		78803				Channel 6 - part of complete assembly
L10	Ant. Coil	0Ω		78803				Channel 5 - part of complete assembly
L11	FL. Choke	0Ω		77206				
L12	Mixer Grid Coil	0Ω		78562				
L13	IF Trap Coil	0Ω		78466				
L14	RF Coil	0Ω		78801				Channel 13 - part of complete assembly
L15	RF Coils	0Ω		78801				Includes stator complete with rotor, coils (Also L14, L16, C15, R13
L16	RF Coil	0Ω		78801				Channel 6 - part of complete assembly
L17	FL. Choke	0Ω		79067				
L18	Mixer Grid Coil	0Ω		78900				Channel 13 - part of complete assembly
L19	Mixer Grid Coils	0Ω						
L20	Mixer Grid Coil	0Ω		78900				Channel 6 - part of complete assembly Channel 13 - part of complete assembly
L21	Osc. Coil	0Ω		79068				Includes stator complete with rotor, coils (also L22), trimmer & C30 Includes 27KΩ resistor
L22	Osc. Coils	0Ω		79068				
L23	Conv. Plate	.6Ω	.4Ω	78399				
L24	47.25MC Trap	.1Ω		78304	30-1047		6316 *	
L25	Ant. Video IF	0Ω	.2Ω	78208	17-4523		6219	
L26	FL. Choke	0Ω		79477	19-3001	TV-189	6604	1 Microhenry
L27	2nd. Video IF	.3Ω	.2Ω	78433	17-4523		6219	
L28	FL. Choke	0Ω		79477	19-3001	TV-189	6604	1 Microhenry
L29	3rd. Video IF	.3Ω	.2Ω	78433	17-4523		6219	
L30	4th. Video IF	.3Ω	.2Ω	78433	17-4523		6219	
L31	Series Peaking Coil	2.1Ω		78011	19-3036	TV-190	6176	36 Microhenries
L32	Shunt Peaking Coil	7.5Ω		96423	19-3250	TV-185	6181	250 Microhenries
L33	Series Peaking Coil	7.5Ω		77674	19-3250 ⊕	TV-185 ⊕	6181 ⊕	250 Microhenries, wound on 2TKΩ resistor
L34	Shunt Peaking Coil	7.5Ω		78931	19-3250 ⊕	TV-185 ⊕	6181 ⊕	250 Microhenries, wound on 10KΩ resistor
L35	4.5MC Trap	8Ω		78157	17-3402		M70	
L36	Shunt Peaking Coil	11Ω		75332	19-3500	TV-186	6174	500 Microhenries
L37	Series Peaking Coil	6Ω		71538	19-4180	TV-183	6179	190 Microhenries, wound on 2KΩ resistor
L38	Sound IF	2.5Ω		78140	16-3445	TV-115	6303	
L39	Ratio Det.	11Ω	.83CT	78141	17-3497	TV-115	6305	Tertiary winding - .2Ω
L40	Horiz. Osc. Waveform	75Ω		78260	30-1468 †	TV-183 †	6183 †	
L41	Winding	44Ω		78161	30-1403 †	TV-182 †	6183 †	
L42	RF Choke	.72Ω		76940	19-1001		4604	1.8 Microhenries, IRC part no. CL-1

* Use one winding only.
■ Parallel with 27KΩ resistor.
▲ Do not use tap winding.
● Parallel with 10KΩ resistor.
† Replaces horizontal oscillator and horizontal phase coil - cut out chassis hole and drill mounting holes.
Note 1: Complete antenna matching trans. part no. 78296. Includes L1, L2, L3, L4, L5, L6 and L7.

RCA VICTOR MODELS 21-S-501, U, 502, U, 503, U, 504, U, 505, U, 506, U, 21-S-517, U, 518, U, 519, U, 521, U, 522, U, 523, U, 525, U, 526, U, 527, U, 21-S-5022, U, 523, U, 5222, U (Ch. KCS88, BX, C, CX, D, DX, E, EX, J, JX, K, KX, L, LX, M, MX, V, VA, VAX, VX)

PARTS LIST AND DESCRIPTIONS (Continued)

FILTER CHOKE

ITEM No.	RATINGS			REPLACEMENT DATA					
	TOTAL DIRECT CURRENT	D. C. RESISTANCE	INDUCTANCE (0 CURRENT 1000 ~)	RCA Victor PART No.	Stancor PART No.	Merit PART No.	Triad PART No.	Halldorson PART No.	Thordarson PART No.
L43	.220A	38Ω	1.3 Hy.	77676	C-2326 ①	C-2996 ①	C-23X ①	C5037 ①	26C44 ①

① Drill one new mounting hole.

FUSES

ITEM No.	TYPE	RATING	REPLACEMENT DATA					
			RCA Victor PART No.		LITTELFUSE PART No.		BUSS PART No.	
			FUSE	HOLDER	FUSE	HOLDER	FUSE	HOLDER
M1	3AG	3/10A 250V	78214	78218	312.300 (3/10A-3AG)	357001	AGC 3/10	4405

CRYSTAL DIODES

ITEM No.	ORIG. TYPE	REPLACEMENT DATA			NOTES
		RCA Victor PART No.	SYLVANIA PART No.		
M2	1N64	76675	1N60 or 1N132		Video Det.

MISCELLANEOUS

ITEM No.	PART NAME	RCA Victor PART No.	NOTES
M3	Dial Light	11891	#44, Bayonet-Not used in models 21-S-501, 21-S-502, 21-S-5022, 21-S-518, 21-S-501U, 21-S-502U, 21-S-5022U & 21-S-518U
M4	Tuner	KRK22D	VHF - Chassis KCS88B, BX; KCS88C, CX; KCS88D, DX; KCS88E, EX; KCS88V, VX.
	Tuner	KRK30	UHF-VHF - Chassis KCS88J, JX, K, KX, L, LX, M, MX, V VX, VA, VAX
M5	Printed IF Sound Circuit Assembly	79142	
M6	Printed IF Picture Circuit Assembly	79479	Used in some versions
M7	Picture IF Circuit Plate Assembly	79156	Not used in some versions.
M8	Switch	79374	UHF-VHF - Chassis KCS88J, JX, K, KX, L, LX, M, MX, VA, VAX
M9	Switch	78211	TV-Pnono - Not used in models 21-S-501, 21-S-502, 21-S-5022, 21-S-518, 21-S-501U, 21-S-502U, 21-S-5022U, 21-S-518U
M10	Focus Magnet	76168	Includes centering device.
M11	Ion Trap	76141	
A13	Trimmer Cap.	77616	43.5MC IF Trap (4-40MMF.)
B2	Trimmer Cap.	71807	Horiz. Drive (10-160MMF.)
A5	Trimmer Cap.	78220	IF Input (5-70MMF.)
	Knob	79471	On-Off-Volume -Models 21-S-5251, U, 21-S-503, U, 21-S-501, U, 21-S-506, U, 21-S-518, U, 21-S-519, U, 21-S-521, U, 21-S-526, U, 21-S-502, U, 21-S-5022, U, 21-S-504, U.
	Knob	79445	On-Off-Volume - Models 21-S-505, U, 21-S-522, U, 21-S-523, U, 21-S-537, U, 21-S-525, U, 21-S-517, U, 21-S-5252, U.
	Knob	79470	Contrast - Models 21-S-5251, U, 21-S-503, U, 21-S-501, U, 21-S-506, U, 21-S-518, U, 21-S-519, U, 21-S-521, U, 21-S-526, U, 21-S-502, U, 21-S-5022, U, 21-S-504, U.
	Knob	79444	Contrast - Models 21-S-505, U, 21-S-522, U, 21-S-523, U, 21-S-537, U, 21-S-525, U, 21-S-517, U, 21-S-5252, U.
	Knob	74978	Tone - Models 21-S-523, U.
	Knob	79133	Tone - For ebony, mahogany, and maroon instruments.
	Knob	79508	UHF Channel Selector - Model 21-S-523U, Mahogany
	Knob	79509	UHF Channel Selector - Model 21-S-523U, Blonde Tropical Hardwood
	Knob	79467	UHF Channel Selector - For ebony, mahogany and maroon instruments.
	Knob	79426	UHF Channel Selector - For Blonde Tropical Hardwood, Oak, Natural Walnut instruments.
	Knob	79465	UHF Fine Tuning
	Knob	79498	VHF Channel Selector - Model 21-S-523, Mahogany
	Knob	79499	VHF Channel Selector - Model 21-S-523, Blonde Tropical Hardwood.
	Knob	79466	VHF Channel Selector - For ebony, mahogany and maroon instruments.
	Knob	79425	VHF Channel Selector - For gold tone, blonde tropical hardwood, oak and natural walnut instruments.
	Knob	79464	VHF Fine Tuning
	Safety Glass	78329	Models 21-S-501, U, 21-S-502, U, 21-S-5022, U.
	Safety Glass	79458	Models 21-S-503, U, 21-S-504, U, 21-S-505, U, 21-S-506, U, 21-S-517, U.
	Safety Glass	79322	Models 21-S-518, U, 21-S-525, U.
	Safety Glass	78815	Models 21-S-519, U, 21-S-521, U, 21-S-522, U, 21-S-523, U, 21-S-526, U, 21-S-537, U.
	Mask	79438	Models 21-S-519, U, 21-S-521, U, 21-S-522, U, 21-S-523, U, 21-S-526, U, 21-S-537, U.

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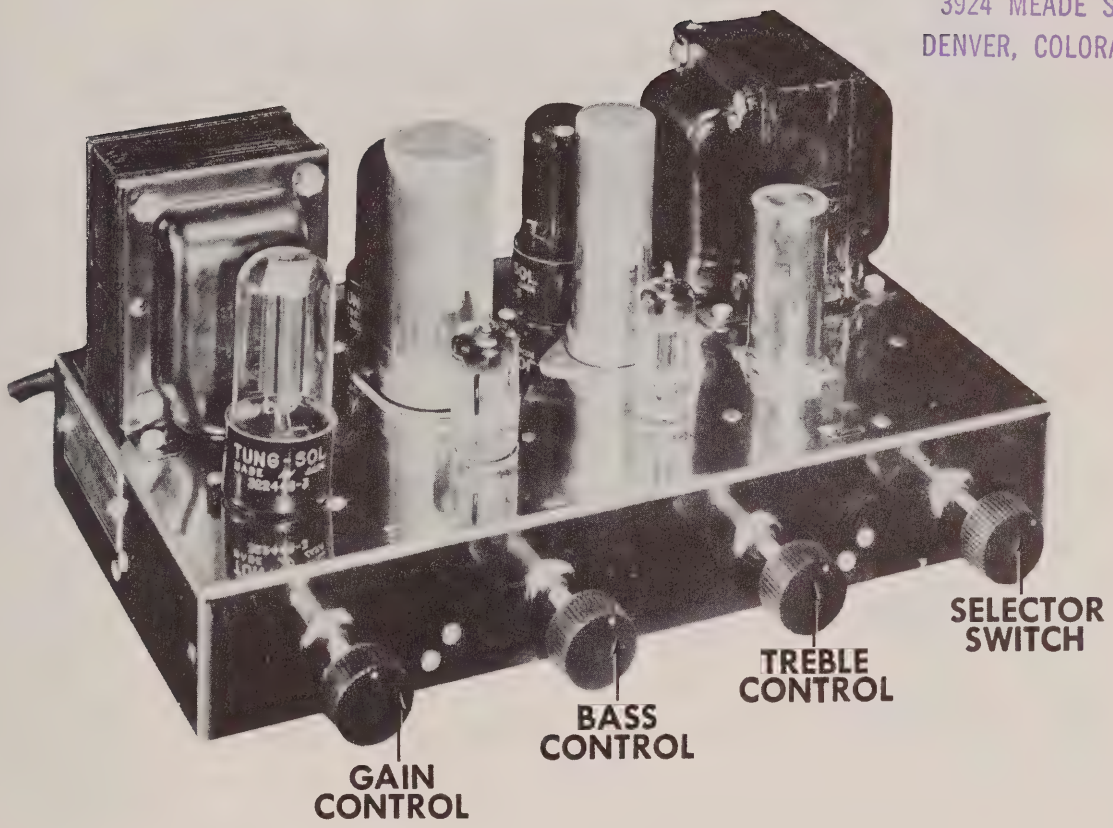
DENVER, COLORADO



REGENCY
MODEL HF-80

TRADE NAME	Regency Model HF-80
MANUFACTURER	Regency Div., I.D.E.A., Inc., 7900 Pendleton Pike, Indianapolis, Ind.
TYPE SET	AC Operated 4 Channel 10 Watt Audio Amplifier
TUBES (Six)	Types 12AX7 Pre-Amp., 6AV6 AF Amp., 12AX7 AF Amp.-Phase Inv., (2) 6V6GT Output, 5Y3GT Rect.
POWER SUPPLY	110-120 Volts AC-50/60 Cycles RATING .62 Amp. @ 117 Volts AC

HOWARD W. SAMS & CO., INC. • Indianapolis 5, Indiana

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PARTS LIST AND DESCRIPTIONS

REGENCY MODEL HF-80

TUBES (SYLVANIA, GENERAL ELECTRIC, WESTINGHOUSE)

ITEM No.	USE	REPLACEMENT DATA: REGENCY PART No.	REPLACEMENT DATA: STANDARD REPLACEMENT	RETMA BASE TYPE	NOTES
V1	Phono Pre-Amp.	12AX7	12AX7	9A	
V2	AF Amplifier	6AV6	6AV6	7BT	
V3	AF Amplifier-Phase Inverter	12AX7	12AX7	9A	
V4	Output	6V6GT	6V6GT	7S	
V5	Output	6V6GT	6V6GT	7S	
V6	Rectifier	5Y3GT	5Y3GT	5T	

CAPACITORS

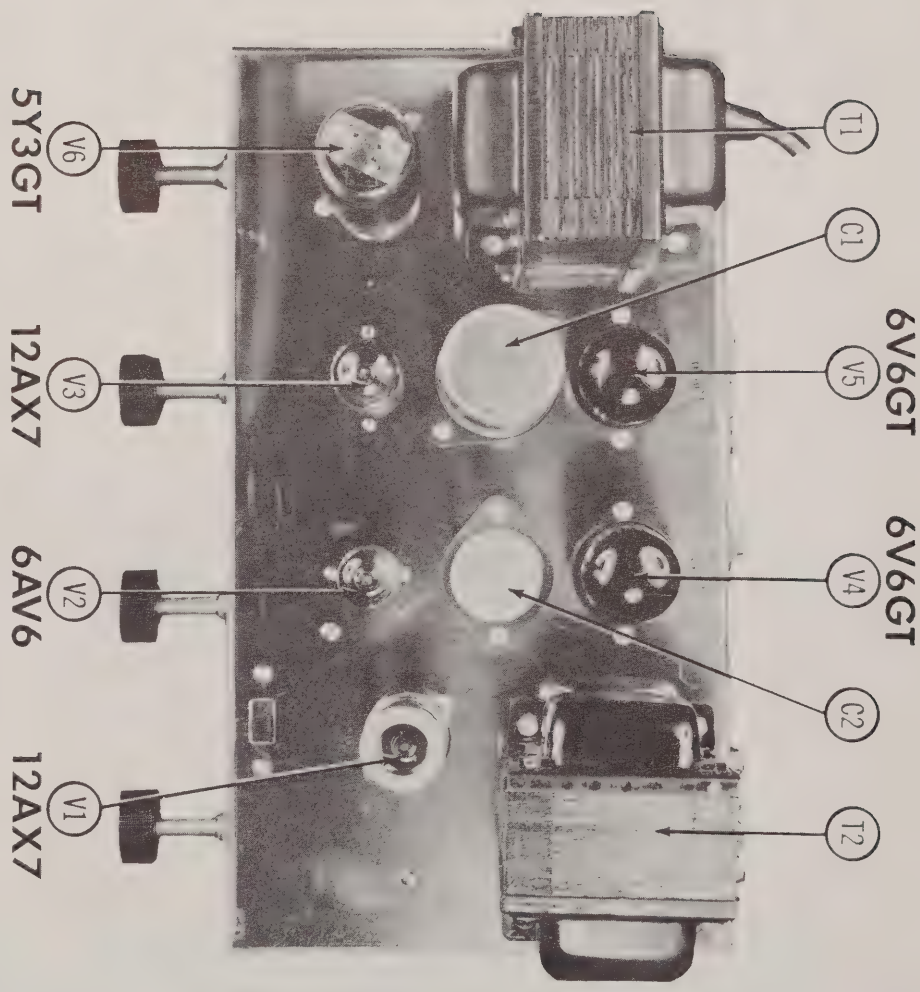
Capacity values given in the rating column are in mfd. for Electrolytic and Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING: CAP.	RATING: VOLT	REPLACEMENT DATA: REGENCY PART No.	CENTRALAB PART No.	ERIE PART No.	MALLORY PART No.	PYRAMID PART No.	SANGAMO PART No.	
C1A	▲20	450	30-011-5			FP376.5	TM-T20-450	T-140	
B	■20	450				TC50025	TD-250-25	MTH-2525	
C	▲20	450							
D	250	25							
C2A	■20	450	300-082-11			FP234	TM-D20-450	D-215	
B	▲20	450							
C3	.03	600				PT613	IMP6-S3	330613	
C4	.01	600		D6-103	GP2-333-103	PT611	IMP6-S1	330611	
C5	.004	600		D6-402	GP2-333-402	PT624	IMP6-D4	330624	
C6	.0068	600		D6-682	GP2-333-682	PT6268	IMP6-D68	3306268	
C7	.0047	600		D6-472	GP2-333-472	PT6247	IMP6-D47	3306247	
C8	.001	600		D6-102	GP2-333-102	PT621	IMP6-D1	330621	
C9	.03	600				PT613	IMP6-S3	330613	
C10	.05	400		DF-503		PT415	IMP4-S5	330415	
C11	.002	600		D6-202	GP2-333-202	PT622	IMP6-D2	330622	
C12	.02	400		DF-203		PT412	IMP4-S2	330412	
C13	150	500				MCE236		KR1315	
C14	.0015	800				PT16215	CT10-D15		
C15	.03	600				PT613	IMP6-S3	330613	
C16	.03	600				PT613	IMP6-S3	330613	
C17	.03	600				PT613	IMP6-S3	330613	
C18	.03	600				PT613	IMP6-S3	330613	

CONTROLS

ITEM No.	RATING: RESISTANCE	RATING: WATTS	REPLACEMENT DATA: REGENCY PART No.	IRC PART No.	CLAROSTAT PART No.	CENTRALAB PART No.	MALLORY PART No.	INSTALLATION NOTES
R1A	500KΩ	½	100-581-7	Q13-133	A47-500K-Z	B-60-S	U-48	Gain
B	Shaft		Not Req.	Not Req.	FS-3	Not Req.	Not Req.	Attach to R1A
C	Switch		Not Req.	76-1	SWE-12	Not Req.	US-26	Attach to R1A
R2A	1Meg	½	100-581-8	Q11-137	A47-1Meg- S	B-70	U-54	Bass
B	Shaft		Not Req.	Not Req.	FS-3	Not Req.	Not Req.	Attach to R2A
R3A	1Meg	½	100-581-8	Q11-137	A47-1Meg-S	B-70	U-54	Treble
B	Shaft		Not Req.	Not Req.	FS-3	Not Req.	Not Req.	Attach to R3A
R4A	500Ω	½	100-582-1	Q11-103	A47-500-S	AB-4	U-2	Hum Adjustment
B	Shaft		Not Req.	Not Req.	FKS-1/4	AK-1	Not Req.	Attach to R4A

CHASSIS—TOP VIEW



PARTS LIST AND DESCRIPTIONS (Continued)

RESISTORS

ITEM No.	RATING		REPLACEMENT DATA		NOTES
	OHMS	WATT	REGENCY PART No.	IRC PART No.	
R5	47KΩ	1/2		BTS-47K	
R6	560Ω	1		BTA-560	
R7	100KΩ	1		BTA-100K	
R8	1Meg	1/2		BTS-1Meg	
R9	1Meg	1/2		BTS-1Meg	
R10	390KΩ	1/2		BTS-390K	
R11	47KΩ	1/2		BTS-47K	
R12	33KΩ	1/2		BTS-33K	
R13	560Ω	1/2		BTS-560	
R14	4700Ω	1/2		BTS-4700	
R15	100KΩ	1/2		BTS-100K	
R16	1Meg	1/2		BTS-1Meg	
R17	100KΩ	1/2		BTS-100K	
R18	10KΩ	1/2		BTS-10K	
R19	100KΩ	1/2		BTS-100K	
R20	1000Ω	1/2		BTS-1000	

ITEM No.	RATING		REPLACEMENT DATA		NOTES
	OHMS	WATT	REGENCY PART No.	IRC PART No.	
R21	150KΩ	1/2		BTS-150K	
R22	12KΩ	1/2		BTS-12K	
R23	1000Ω	1/2		BTS-1000	
R24	100KΩ	1/2		BTS-100K	
R25	470KΩ	1/2		BTS-470K	
R26	1000Ω	1/2		BTS-1000	
R27	100KΩ	1/2		BTS-100K	
R28	100KΩ	1/2		BTS-100K	
R29	470KΩ	1/2		BTS-470K	
R30	250Ω	10		PW10-250	
R31	470KΩ	1/2		BTS-470K	
R32	1000Ω	1/2		BTS-1000	
R33	3Ω	2			
R34	3Ω	1			
R35	10KΩ	1		BTA-10K	
R36	22KΩ	1/2		BTS-22K	
R37	47KΩ	1/2		BTS-47K	

TRANSFORMER (POWER)

ITEM No.	RATING				REPLACEMENT DATA					
	PRI.	SEC. 1	SEC. 2	SEC. 3	REGENCY PART No.	Stancor PART No.	Merit PART No.	Triad PART No.	Halldorson PART No.	Thordarson PART No.
T1	117VAC @.62A	624VCT .088A	5VAC @2A	6.3VAC @1.75A		PC-8409 ①				

TRANSFORMER (AUDIO OUTPUT)

ITEM No.	IMPEDANCE		REPLACEMENT DATA						NOTES
	PRI.	SEC.	REGENCY PART No.	Stancor PART No.	Merit PART No.	Triad PART No.	Halldorson PART No.	Thordarson PART No.	
T2	7KΩ CT tap @ 69Ω CT RES	16Ω tap @ 8Ω, 4Ω							

MISCELLANEOUS

ITEM No.	PART NAME	REGENCY PART No.	NOTES
M1	Switch	100-623	Selector & Compensator (wafer type)
M2	Switch	100-612	Rumble Filter (SPDT Slide type)
	Knob	100-622	4 used

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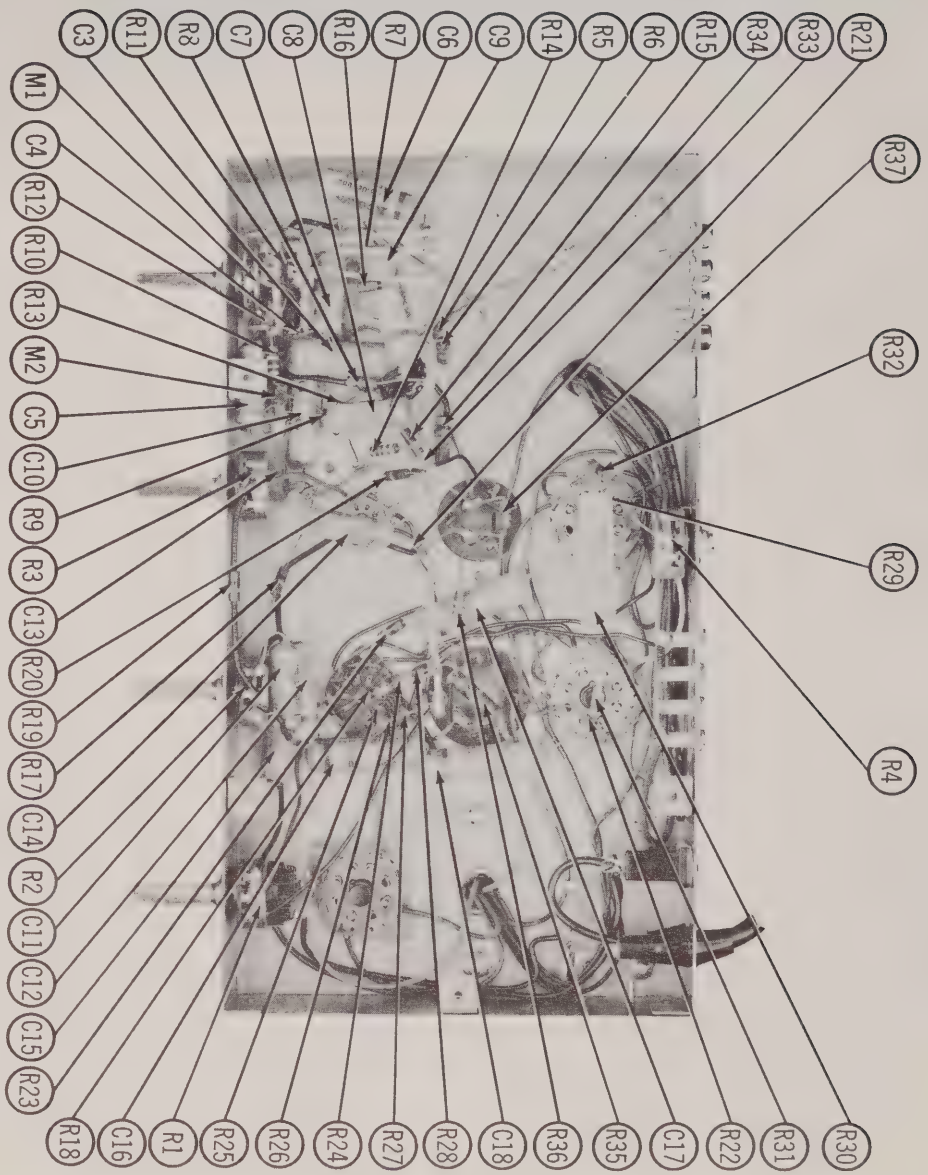
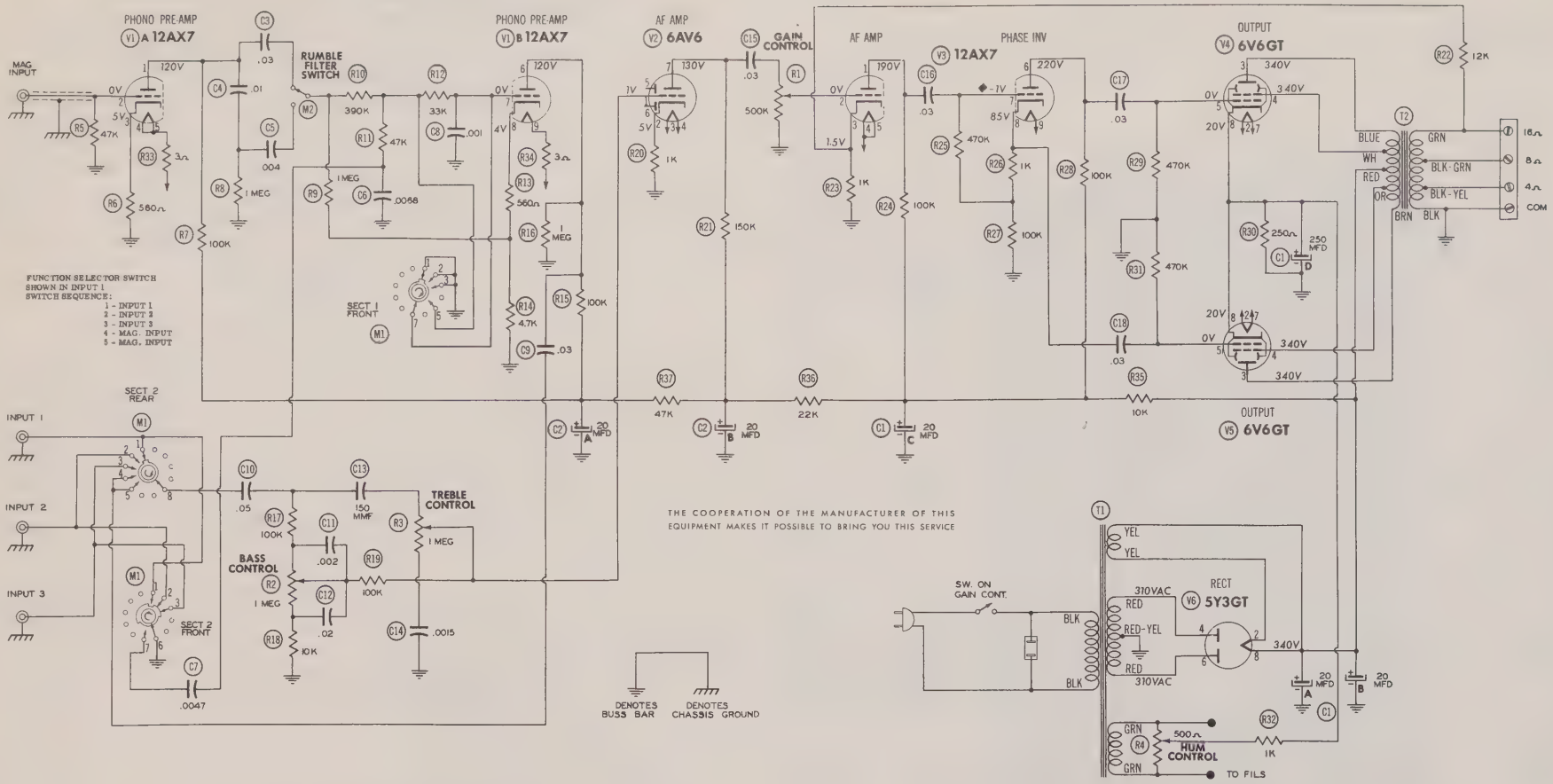
CHASSIS—BOTTOM VIEW





RESISTANCE READINGS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8	Pin 9
V 1	12AX7	†180KΩ	0Ω	560Ω	1KΩ	1KΩ	†180KΩ	1.5Meg	5.5KΩ	1KΩ
V 2	6AV6	800KΩ	1KΩ	1KΩ	1KΩ	INF	INF	180KΩ		
V 3	12AX7	†110KΩ	200KΩ	1KΩ	1KΩ	1KΩ	110KΩ	600KΩ	100KΩ	1KΩ
V 4	6V6GT	0Ω	1KΩ	†135Ω	†35Ω	470KΩ	INF	1KΩ	250Ω	
V 5	6V6GT	0Ω	1KΩ	†135Ω	†35Ω	470KΩ	INF	1KΩ	250Ω	
V 6	5Y3GT	INF	18KΩ	INF	98Ω	INF	108Ω	INF	18KΩ	

* MEASURED FROM PIN 8 OF V3
† MEASURED FROM PIN 8 OF V6

1. DC voltage measurements taken with vacuum tube voltmeter; AC voltages measured at 1000 ohms per volt.
2. Socket connections are shown as bottom views.
3. Measured values are from socket pin to common negative.
4. Line voltage maintained at 117 volts for voltage readings.
5. Nominal tolerance on component values makes possible a variation of ± 15% in voltage and resistance readings.
6. All controls at minimum, proper output load connected.

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H. H. SCOTT
MODELS 232, 232A

INPUT LEVEL CONTROL

H. H. SCOTT
MODELS 232, 232A

TRADE NAME	H.H. Scott Models 232, 232A
MANUFACTURER	Hermon H. Scott, Inc., 385 Putnam Ave., Cambridge 39, Mass.
TYPE SET	AC Operated 2 Channel Audio Amplifier
TUBES (Five)	Types 12AU7 AF Amp., 12AU7 AF Amp.-Phase Inv., (2) 1614 Output, 5U4G Rectifier
POWER SUPPLY	110-120 Volts AC-50/60 Cycles RATING 1.1 Amp. @ 117 Volts AC

HOWARD W. SAMS & CO., INC. • Indianapolis 5, Indiana

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PARTS LIST AND DESCRIPTIONS

TUBES (SYLVANIA, GENERAL ELECTRIC, WESTINGHOUSE)

ITEM No.	USE	REPLACEMENT DATA: H.H. Scott PART No.	REPLACEMENT DATA: STANDARD REPLACEMENT	RETMA BASE TYPE	NOTES
V1	AF Amplifier	12AU7	12AU7	9A	
V2	AF Amplifier - Phase Inverter	12AU7	12AU7	9A	
V3	Output	1614	1614	7S	
V4	Output	1614	1614	7S	
V5	Rectifier	5U4G	5U4G	5T	

CAPACITORS

Capacity values given in the rating column are in mfd. for Electrolytic and Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING: CAP.	RATING: VOLT	REPLACEMENT DATA: H.H. Scott PART No.	CENTRALAB PART No.	ERIE PART No.	MALLORY PART No.	PYRAMID PART No.	SANGAMO PART No.
C1A	▰20	475				FP475	TM-303020-500	Q-075
B	■20	475						
C	▲20	475						
D	20	475						
C2A	▰10	450						
B	■10	450				FP426	TM-4092	Q-295
C	▲25	25						
D	25	25						
C3	50	100	CET-50/100			TC49	TD-50-150	FM-1550
C4	10	500	CM15-10-5			MC215		K-1410
C5	.0047	400	CPM-0047	D6-472	GP2-333-472	PT4247	IMP4-D47	3306247
C6	.01	400	CPM-.01	D6-103	GP2-333-103	PT411	IMP4-S1	330411
C7	.022	400	CPM-.022			PT4122	IMP4-S22	3304122
C8	680	500	CM20-680					K-1368
C9	220	500	CM20-220					K-1322
C10	.047	400	CPM-.047	DF-503		PT4147	IMP4-S47	3304147
C11	.047	400	CPM-.047	DF-503		PT4147	IMP4-S47	3304147

CONTROLS

ITEM No.	RATING: RESISTANCE	RATING: WATTS	REPLACEMENT DATA: H.H. Scott PART No.	IRC PART No.	CLAROSTAT PART No.	CENTRALAB PART No.	MALLORY PART No.	INSTALLATION NOTES
R1A	500KΩ	½	RCV-500K-3	Q13-133	A47-500K-Z	B-60	U-48	Input Level
B	Shaft		Not Req.	Not Req.	RS-2	Not Req.	Not Req.	Attach to R1A
R2A	50KΩ	½	RCV-50K-S	Q11-123	A47-50K-S	AB-31	SU-35	Balance
B	Shaft		Not Req.	RQ	FKS-1/4	AK-1	Not Req.	Attach to R2A
R3A	500Ω	½	RCV-500-S	Q11-103	A47-500-S	AB-4	U-2	Hum Adjust
B	Shaft		Not Req.	RQ	FKS-1/4	AK-1	Not Req.	Attach to R3A

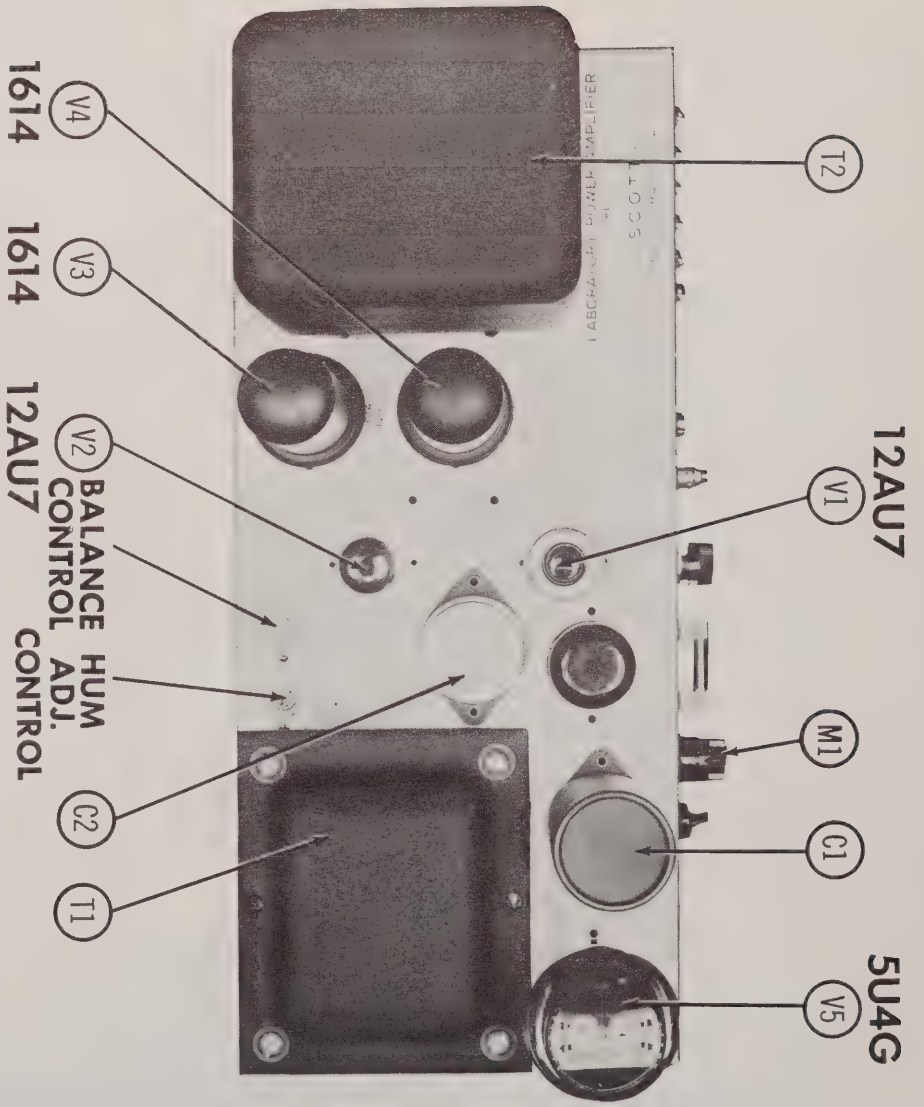
RESISTORS

ITEM No.	RATING: OHMS	RATING: WATT	REPLACEMENT DATA: H.H. Scott PART No.	REPLACEMENT DATA: IRC PART No.	NOTES
R4	1Meg	½	RC-21-1Meg	BTS-1Meg	
R5	4700	½	RC-21-4700	BTS-4700	
R6	220KΩ	½	RC-21-220K	BTS-220K	
R7	220KΩ	½	RC-21-220K	BTS-220K	
R8	2.2Meg	½	RC-21-2.2 Meg	BTS-2.2Meg	
R9	2200Ω	½	RC-21-2200	BTS-2200	
R10	100KΩ	1	RC-31-100K	BTA-100K	
R11	2.2Meg	½	RC-21-2.2 Meg	BTS-2.2Meg	
R12	6800Ω	½	RC-21-6800	BTS-6800	
R13	100KΩ	1	RC-31-100K	BTA-100K	
R14	15KΩ	½	RC-21-15K	BTS-15K	
R15	220KΩ	½	RC-21-220K	BTS-220K	
R16	2.2Meg	½	RC-21-2.2 Meg	BTS-2.2Meg	
R17	2200Ω	½	RC-21-2200	BTS-2200	
R18	100KΩ	1	RC-31-100K	BTA-100K	
R19	270KΩ	½	RC-21-270K	BTS-270K	

ITEM No.	RATING: OHMS	RATING: WATT	REPLACEMENT DATA: H.H. Scott PART No.	REPLACEMENT DATA: IRC PART No.	NOTES
R20	330KΩ	½	RC-21-330K	BTS-330K	
R21	1000Ω	½	RC-21-1K	BTS-1000	
R22	330KΩ	½	RC-21-330K	BTS-330K	
R23	1000Ω	½	RC-21-1K	BTS-1000	
R24	3300Ω	½	RC-21-3300	BTS-3300	
R25	33Ω	4	RW-4-33		
R26	160Ω	7	RW7-160		
R27	1500Ω	2	RC-41-1500	BTB-1500	
R28	25KΩ	10	RW-10-25K	1 3/4A-25K	
R29	33KΩ	½	RC-21-33K	BTS-33K	
R30	470KΩ	½	RC-21-470K	BTS-470K	
R31	2200Ω	2	RC-41-2200	BTB-2200	
R32	2200Ω	2	RC-41-2200	BTB-2200	
R33	1200Ω	10	RW-10-1250		
R34	82Ω	4	RW-4-82		
R35	160Ω	5	RW-5-160		
R36	2.7Ω	1	RC-31-27		
R37	10KΩ	½		BTS-10K	Note 1

Note 1. Not used in some versions.

CHASSIS—TOP VIEW



PARTS LIST AND DESCRIPTIONS (Continued)

TRANSFORMER (POWER)

ITEM No.	RATING				REPLACEMENT DATA					
	PRI.	SEC. 1	SEC. 2	SEC. 3	H.H. Scott PART No.	Stancor PART No.	Merit PART No.	Triad PART No.	Halldorson PART No.	Thordarson PART No.
T1	117VAC @1.1A	744VCT .154A	5VAC @3A	6.3VAC @2.42A	TR-15-1					

TRANSFORMER (AUDIO OUTPUT)

ITEM No.	IMPEDANCE		REPLACEMENT DATA						NOTES
	PRI.	SEC.	H.H. Scott PART No.	Stancor PART No.	Merit PART No.	Triad PART No.	Halldorson PART No.	Thordarson PART No.	
T2	5.2KΩ CT	16Ω tap @ 8Ω,4Ω, 2Ω	TRA10-11C				H4101 ①		① Drill new mounting holes.

FUSES

ITEM No.	TYPE	RATING	REPLACEMENT DATA					
			H. H. Scott PART No.		LITTELFUSE PART No.		BUSS PART No.	
			FUSE	HOLDER	FUSE	HOLDER	FUSE	HOLDER
M1	3AG S/B	2A 125V			313002 (3AG S/B-2A)	342003	MDL2	HKP

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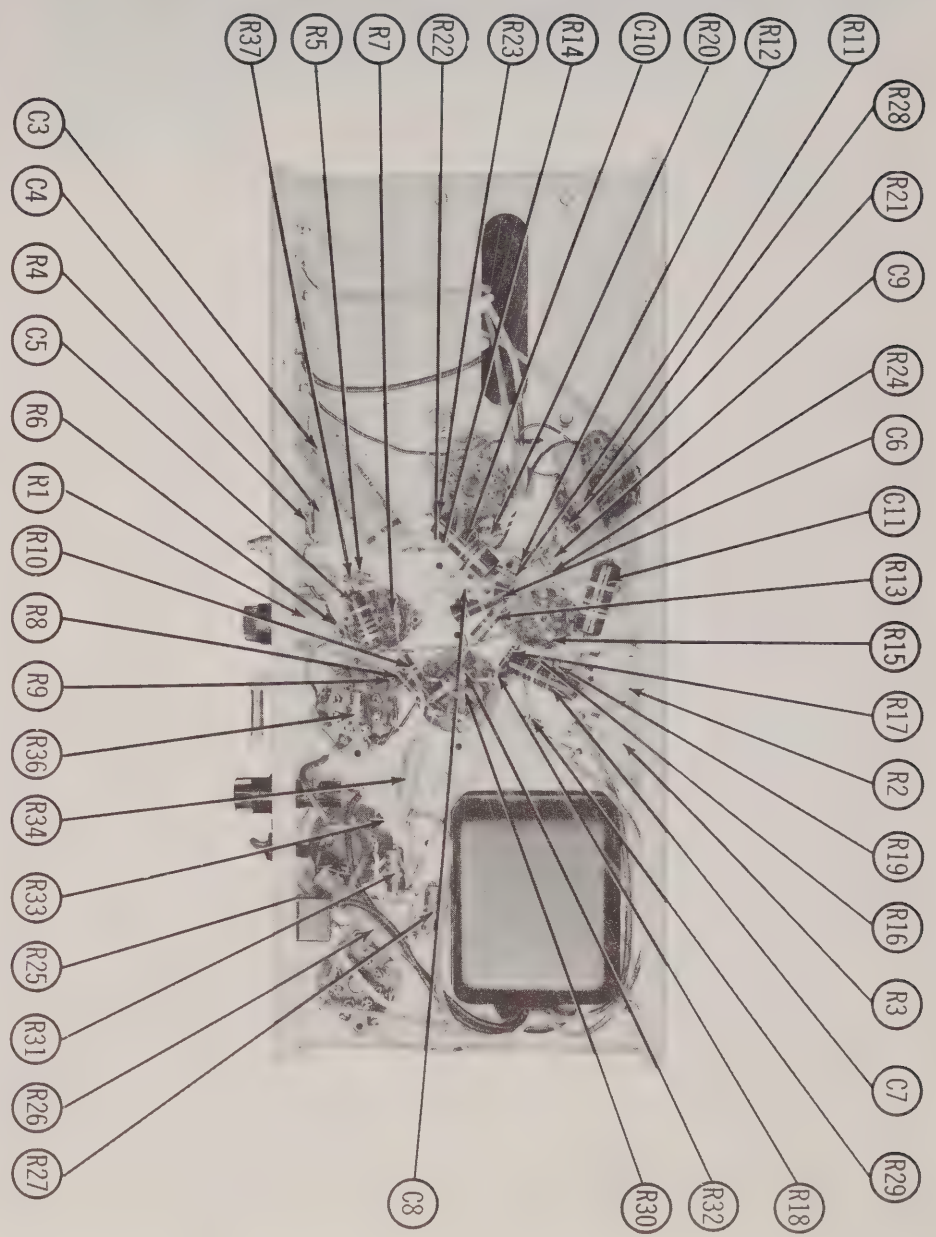
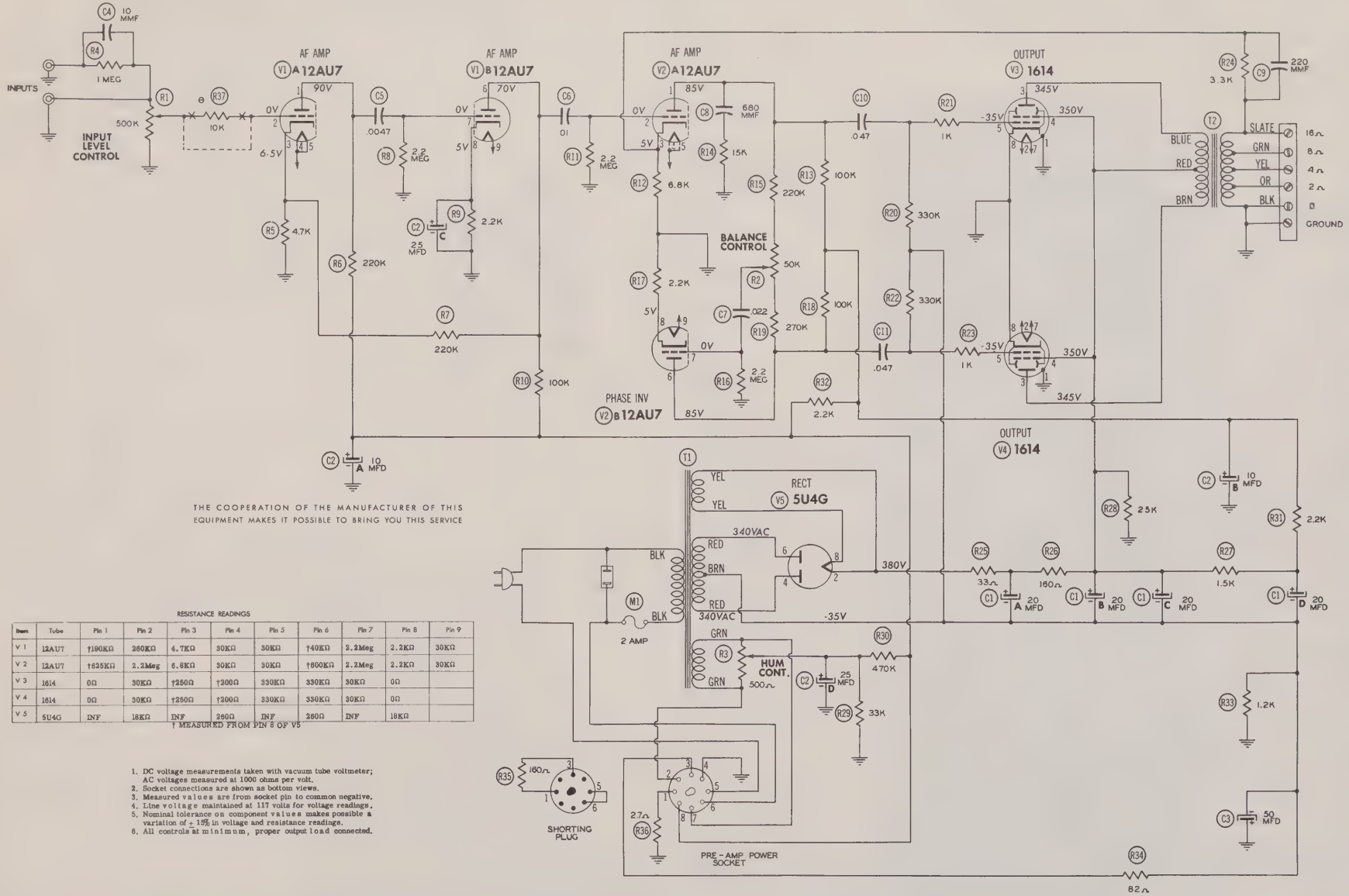
DENVER, COLORADO

CHASSIS—BOTTOM VIEW



H.H. SCOTT MODEL 232

H.H. SCOTT MODEL 232



THE COOPERATION OF THE MANUFACTURER OF THIS EQUIPMENT MAKES IT POSSIBLE TO BRING YOU THIS SERVICE

RESISTANCE READINGS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8	Pin 9
V 1	12AU7	†190KΩ	360KΩ	4.7KΩ	30KΩ	30KΩ	†40KΩ	2.2Meg	2.2KΩ	30KΩ
V 2	12AU7	†625KΩ	2.2Meg	6.8KΩ	30KΩ	30KΩ	†600KΩ	2.2Meg	2.2KΩ	30KΩ
V 3	1614	0Ω	30KΩ	†250Ω	†200Ω	330KΩ	330KΩ	30KΩ	0Ω	
V 4	1614	0Ω	30KΩ	†250Ω	†200Ω	330KΩ	330KΩ	30KΩ	0Ω	
V 5	5U4G	INF	18KΩ	INF	260Ω	INF	260Ω	INF	18KΩ	

† MEASURED FROM PIN 8 OF V5

1. DC voltage measurements taken with vacuum tube voltmeter; AC voltages measured at 1000 ohms per volt.
2. Socket connections are shown as bottom views.
3. Measured values are from socket pin to common negative.
4. Line voltage maintained at 117 volts for voltage readings.
5. Nominal tolerance on component values makes possible a variation of ± 10% in voltage and resistance readings.
6. All controls at minimum, proper output load connected.

A PHOTOFACT STANDARD NOTATION SCHEMATIC

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272-13

PROPERTY OF
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, COLORADO

SILVERTONE
MODEL 4210 (Ch. 528.308)

SILVERTONE
MODEL 4210 (Ch. 528.308)

TRADE NAME	Silvertone Model 4210 (Ch. 528.308)
SUPPLIER	Sears, Roebuck & Co., 925 S. Homan, Chicago, Ill.
TYPE SET	Battery Operated Portable AM Superheterodyne Receiver
TUBES (Four)	Types 1R5 Conv., 1U4 IF Amp., 1U5 Det.-AVC-AF Amp., 3Q4 Output
POWER SUPPLY RATINGS	1.5 Volts "A" Supply & 67.5 Volts "B" Supply 235MA @ 1.5 Volts DC & 7.5MA @ 67.5 Volts DC
TUNING RANGE—BROADCAST	540KC-1625KC

ALIGNMENT INSTRUCTIONS—READ CAREFULLY BEFORE ATTEMPTING ALIGNMENT

Volume control should be at maximum position. Output of signal generator should be no higher than necessary to obtain an output reading. Use an insulated alignment screwdriver for adjusting.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	RADIO DIAL SETTING	OUTPUT METER	ADJUST	REMARKS
1.	.1MFD	High side to pin 6 (grid) of 1U4 (V2). Low side to chassis.	455KC (400~Mod)	Tuning gang fully open	Across voice coil	A1, A2	Adjust for maximum output.
2.	"	High side to pin 6 (grid) of 1R5 (V1). Low side to chassis.	"	"	"	A3, A4	"
3.	"	High side to antenna stator lug. Low side to chassis.	1625KC	"	"	A5	"
4.	Direct	Loop	1400KC	Tune to 1400KC signal	"	A6	Fashion loop of several turns of wire and radiate signal into loop of receiver. Adjust for maximum output.
5.	"	"	600KC	Tune to 600KC signal	"	A7	Adjust for maximum output while rocking tuning gang.

HOWARD W. SAMS & CO., INC. • Indianapolis 5, Indiana

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PARTS LIST AND DESCRIPTIONS

TUBES (SYLVANIA, GENERAL ELECTRIC, WESTINGHOUSE)

ITEM No.	USE	REPLACEMENT DATA: Silvertone PART No.	REPLACEMENT DATA: STANDARD REPLACEMENT	RETMA BASE TYPE	NOTES
V1	Converter	1R5	1R5	7AT	
V2	IF Amplifier	1U4	1U4	6AR	
V3	Det.-AVC-AF Amp.	1U5	1U5	6BW	
V4	Output	3Q4	3Q4	7BA	

CAPACITORS

Capacity values given in the rating column are in mfd. for Electrolytic and Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING: CAP.	RATING: VOLT	REPLACEMENT DATA: Silvertone PART No.	CENTRALAB PART No.	ERIE PART No.	MALLORY PART No.	PYRAMID PART No.	SANGAMO PART No.	
C1	4	75	T18-319			TC40	TD-4-150	MMT-1505	
C2	.05	200	T16-197	DF-503		PT415	IMP2-S5	330215	
C3A	150		T17-105	PC-165					Note 1
B	2000								
C	150								
D	10000								
E	5000								
C4	1000		T15-220	DD-102	811-001	DC-521	IMP6-D1	330621	

Note 1. Items C3A, C3B, C3C, C3D, C3E, R4A, R4B, R4C and R4D are combined in one unit.

CONTROLS

ITEM No.	RATING: RESISTANCE	RATING: WATTS	REPLACEMENT DATA: Silvertone PART No.	IRC PART No.	CLAROSTAT PART No.	CENTRALAB PART No.	MALLORY PART No.	INSTALLATION NOTES
R1A	1Meg	½	A24-205	Q13-137	A47-1Meg-Z	B-70-S	U-53	Volume
B	Shaft		Not Req.	Not Req.	FS-3	Not Req.	Not Req.	Attach to R1A
C	Switch		Not Req.	76-2	SWE-20	Not Req.	US-27	Attach to R1A

RESISTORS

ITEM No.	RATING: OHMS	RATING: WATT	REPLACEMENT DATA: Silvertone PART No.	REPLACEMENT DATA: IRC PART No.	NOTES
R2	100KΩ	½	T60-727	BTS-100K	
R3	2.2Meg	½	T60-726	BTS-2.2Meg	
R4A	10Meg	½	♦T17-105	BTS-10Meg	
B	4.7Meg	½		BTS-4.7Meg	
C	1Meg	½		BTS-1Meg	
D	3.3Meg	½		BTS-3.3Meg	

ITEM No.	RATING: OHMS	RATING: WATT	REPLACEMENT DATA: Silvertone PART No.	REPLACEMENT DATA: IRC PART No.	NOTES
R5	270Ω	½	T60-771	BTS-270	

♦ Items R4A, R4B, R4C, R4D, C3A, C3B, C3C, C3D and C3E are combined in one unit.

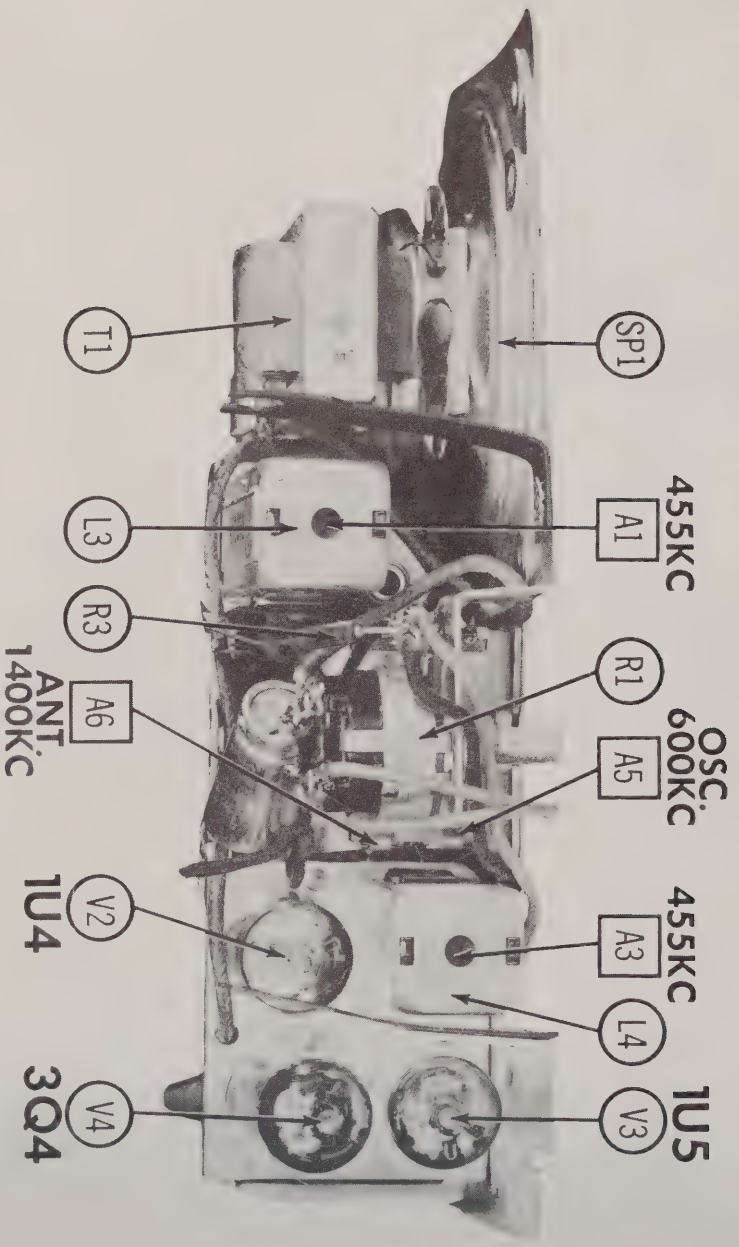
TRANSFORMER (AUDIO OUTPUT)

ITEM No.	IMPEDANCE: PRI.	IMPEDANCE: SEC.	REPLACEMENT DATA: Silvertone PART No.	Stancor PART No.	Merit PART No.	Triad PART No.	Halldorson PART No.	Thordarson PART No.	NOTES
T1	9.5KΩ	3.1Ω	80-281	A-3329 ①	A-2998 ①	S-11X ①		24S49 ①	① Bend mounting tabs down, file out slots. Mount on original mounting bracket.

SPEAKER

ITEM No.	RATINGS: SIZE	RATINGS: FIELD	RATINGS: V. C. IMP.	REPLACEMENT DATA: Silvertone PART No.	VIKING PART No.	QUAM PART No.	NOTES
SP1	3½"	PM	3.1Ω	T79-407	35J6	3A07	

CHASSIS—TOP VIEW



PARTS LIST AND DESCRIPTIONS (Continued)

COILS (RF-IF)

ITEM No.	USE	DC RES. PRI.	DC RES. SEC.	REPLACEMENT DATA Silvertone PART No.	MEISSNER PART No.	MERIT PART No.	MILLER PART No.	NOTES
L1	Ant. Coil	.3Ω		T82-91				
L2	Osc. Coil	2Ω	9.5Ω	T10-663				
L3	Input IF	20Ω	20Ω	T10-508	16-6758	BC-352	12-C1	
L4	Output IF	20Ω	20Ω	T10-508	16-6758	BC-353	12-C2	

BATTERIES

ITEM No.	VOLTAGE	Silvertone PART No.	REPLACEMENT DATA EVEREADY "A"	EVEREADY "B"	EVEREADY "A-B"	BURGESS "A"	BURGESS "B"	BURGESS "A-B"	INSTALLATION NOTES
M1	1.5V "A"	6442	964			2IR			Connect 2 in parallel
M2	67.5V "B"	6482		477			P45		

MISCELLANEOUS

ITEM No.	PART NAME	Silvertone PART No.	NOTES
M3	Tuning Cap.	T19-237	15-240MMF, 9-90MMF
	Cabinet	T42-664	
	Handle	T53-19	Cabinet
	Knob	T52-459	On-off-volume
	Knob	T52-458	Tuning

CHASSIS—BOTTOM VIEW

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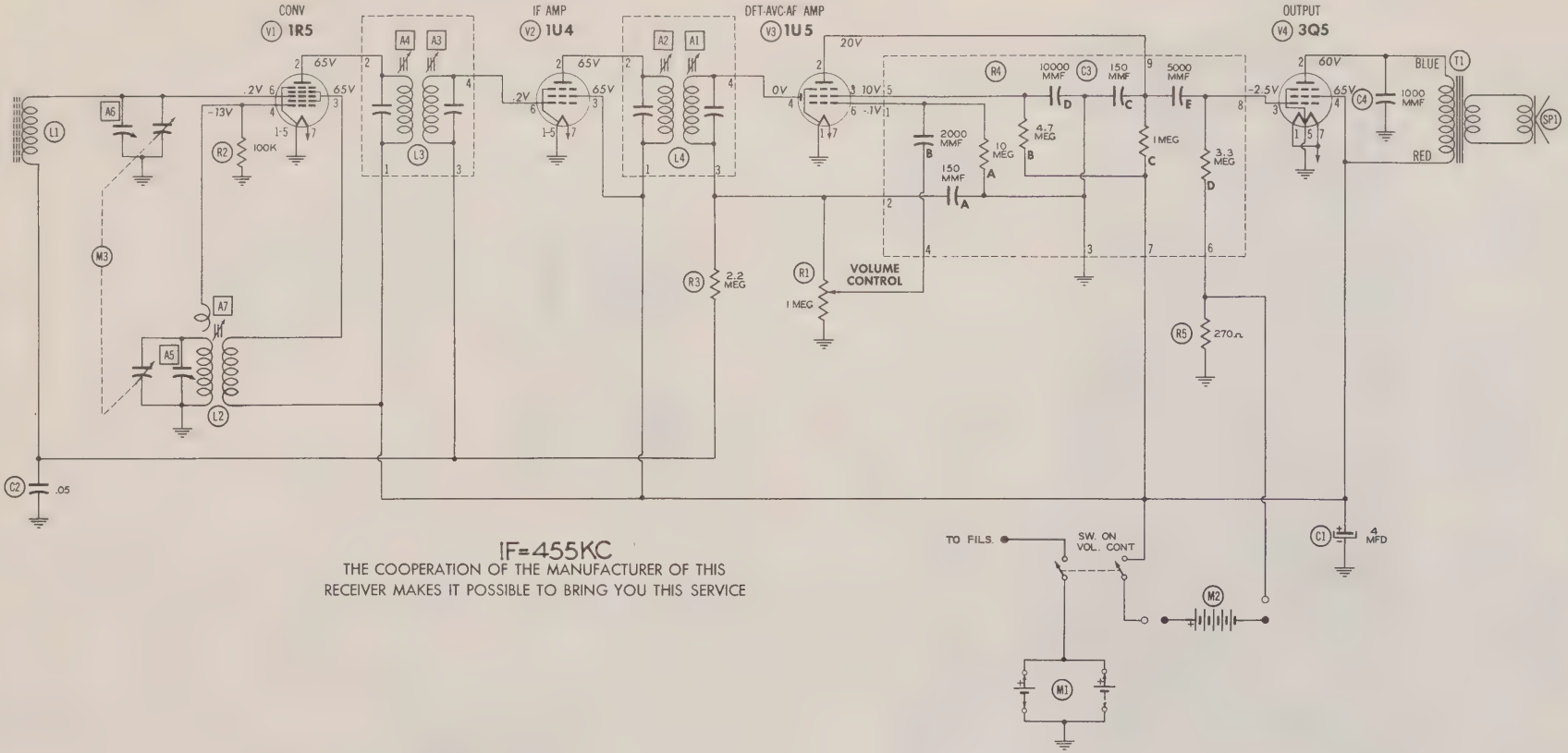
3924 MEADE ST.
DENVER, COLORADO

SILVERTONE
MODEL 4210 (Ch. 528.308)



IF=455KC

THE COOPERATION OF THE MANUFACTURER OF THIS RECEIVER MAKES IT POSSIBLE TO BRING YOU THIS SERVICE

RESISTANCE READINGS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7
V 1	1R5	*	†20Ω	†2Ω	100KΩ	*	3.2Meg	*
V 2	1U4	*	†20Ω	†0Ω	270Ω	*	3.2Meg	*
V 3	1U5	*	†1Meg	†4.7Meg	160KΩ	1Meg	10Meg	*
V 4	3Q4	*	†365Ω	3.3Meg	†0Ω	*	†365Ω	*

* DO NOT USE OHMMETER TO MEASURE FILAMENT RESISTANCE.
† MEASURED FROM B+ LINE.

1. DC voltage measurements taken with vacuum tube voltmeter; AC voltages measured at 1000 ohms per volt.
2. Socket connections are shown as bottom views.
3. Measured values are from socket pin to common negative.
4. Nominal tolerance on component values makes possible a variation of ± 15% in voltage and resistance readings.
5. Volume control at maximum, no signal applied for voltage measurements.

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TRUETONE MODELS D2410B, D2411B, D2412B, D2413B

PROPERTY OF
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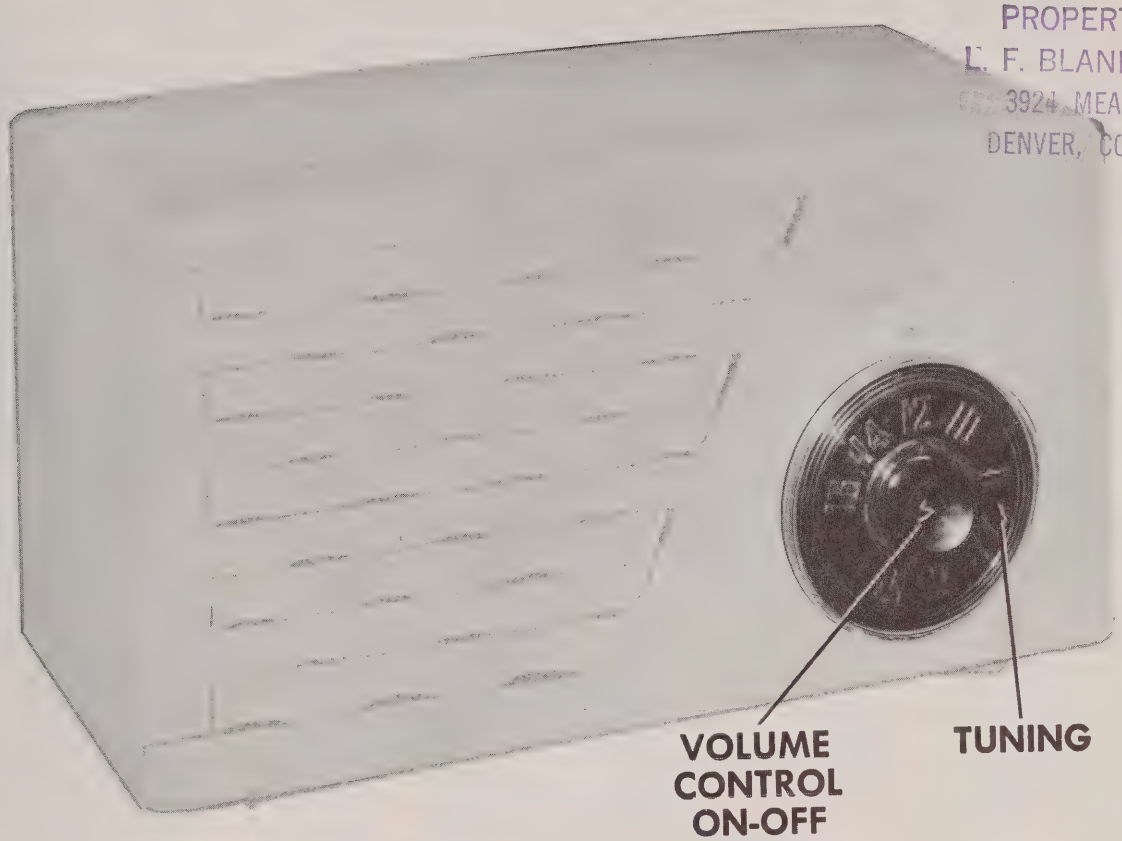
DENVER, COLORADO

TRUETONE MODELS
D2410B, D2411B, D2412B, D2413B



TRUETONE MODELS
D2410B, D2411B, D2412B, D2413B

TRADE NAME	Truetone Models D2410B, D2411B, D2412B, D2413B
SUPPLIER	Western Auto Supply Co., 2107 Grand Ave., Kansas City, Mo..
TYPE SET	AC-DC Operated AM Superheterodyne Receiver
TUBES (Five)	Types 12BE6 Conv., 12BA6 IF Amp., 12AV6 Det.-AVC-AF Amp., 50C5 Output, 35W4 Rectifier
POWER SUPPLY	110-120 Volts AC-DC — RATING .23 Amp. @ 117 Volts AC
TUNING RANGE—BROADCAST	535KC-1630KC

ALIGNMENT INSTRUCTIONS—READ CAREFULLY BEFORE ATTEMPTING ALIGNMENT

Volume control should be at maximum position. Output of signal generator should be no higher than necessary to obtain an output reading. Use an insulated alignment screwdriver for adjusting.
Loop should be maintained in same relative position to chassis as when receiver is in cabinet.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	RADIO DIAL SETTING	OUTPUT METER	ADJUST	REMARKS
1.	.1MFD	High side to pin 7 (grid) of 12BE6 (V1). Low side to chassis.	455KC (400~Mod)	Tuning gang fully open	Across voice coil	A1, A2, A3, A4	Adjust for maximum output. If isolation transformer is not used, reduce dummy antenna to .001MFD to reduce hum modulation.
2.	"	"	1625KC	"	"	A5	"
3.	Direct	Loop	1400KC	Tune to 1400KC signal	"	A6	Fashion loop of several turns of wire and radiate signal into loop of receiver. Adjust for maximum output.

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PARTS LIST AND DESCRIPTIONS

TRUETONE MODEL D2410B

TUBES (SYLVANIA, GENERAL ELECTRIC, WESTINGHOUSE)

ITEM No.	USE	REPLACEMENT DATA: TRUETONE PART No.	REPLACEMENT DATA: STANDARD REPLACEMENT	RETMA BASE TYPE	NOTES
V1	Converter	12BE6	12BE6	7CH	
V2	IF Amplifier	12BA6	12BA6	7BK	
V3	Det.-AVC-AF Amp.	12AV6	12AV6	7BT	
V4	Output	50C5	50C5	7CV	
V5	Rectifier	35W4	35W4	5BQ	

CAPACITORS

Capacity values given in the rating column are in mfd. for Electrolytic and Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING: CAP.	RATING: VOLT	REPLACEMENT DATA: TRUETONE PART No.	CENTRALAB PART No.	ERIE PART No.	MALLORY PART No.	PYRAMID PART No.	SANGAMO PART No.	
C1A	50	150				TD-497	TDL-5030-150	FMD-301	
B	30	150							
C2	.05	400	C054	DF-503		PT415	IMP4-S5	330415	
C3A	100		PC50	PC-50	1403-01	UC-531		K-1310	Note 1
B	100					UC-531		K-1310	
C4	.005	600		DD-502	GP2-333-502	PT625	IMP6-D5	330625	Note 2
C5A	5000		PC70	PC-70	1406-01				Note 3
B	250								
C									
C6	.05	400	C054	DF-503		PT415	IMP4-S5	330415	
C7	.1	400	C104	DF-104		PT401	IMP4-P1	330401	

Note 1. Items C3A, C3B, R4 are combined in one unit.
Note 2. Some versions use a 2000MMF disc in this application.
Note 3. Items C5A, C5B, C5C, R7A and R7B are combined in one unit.
When replacing items separately items C3B and C3C should total 250MMF.

CONTROLS

ITEM No.	RATING: RESISTANCE	RATING: WATTS	REPLACEMENT DATA: TRUETONE PART No.	IRC PART No.	CLAROSTAT PART No.	CENTRALAB PART No.	MALLORY PART No.	INSTALLATION NOTES
R1	1Meg	½	VRT85					Volume & switch

RESISTORS

ITEM No.	RATING: OHMS	RATING: WATT	REPLACEMENT DATA: TRUETONE PART No.	REPLACEMENT DATA: IRC PART No.	NOTES
R2	22KΩ	½	R223.5	BTS-22K	
R3	390KΩ	½	R391.5	BTS-390	
R4	47KΩ	1	♦PC50	BTS-47K	
R5	2.2Meg	½	R225.5	BTS-2.2Meg	
R6	10Meg	½	R107.5	BTS-10Meg	

ITEM No.	RATING: OHMS	RATING: WATT	REPLACEMENT DATA: TRUETONE PART No.	REPLACEMENT DATA: IRC PART No.	NOTES
R7A	470KΩ	½	†PC70	BTS-470K	
B	470KΩ	½		BTS-470K	
R8	150Ω	½	R151.5	BTS-150	
R9	1200Ω	1	R1222	BTA-1200	

♦ Items R4, C3A and C3B are combined in one unit.
† Items R7A, R7B, C5A, C5B, C5C are combined in one unit.

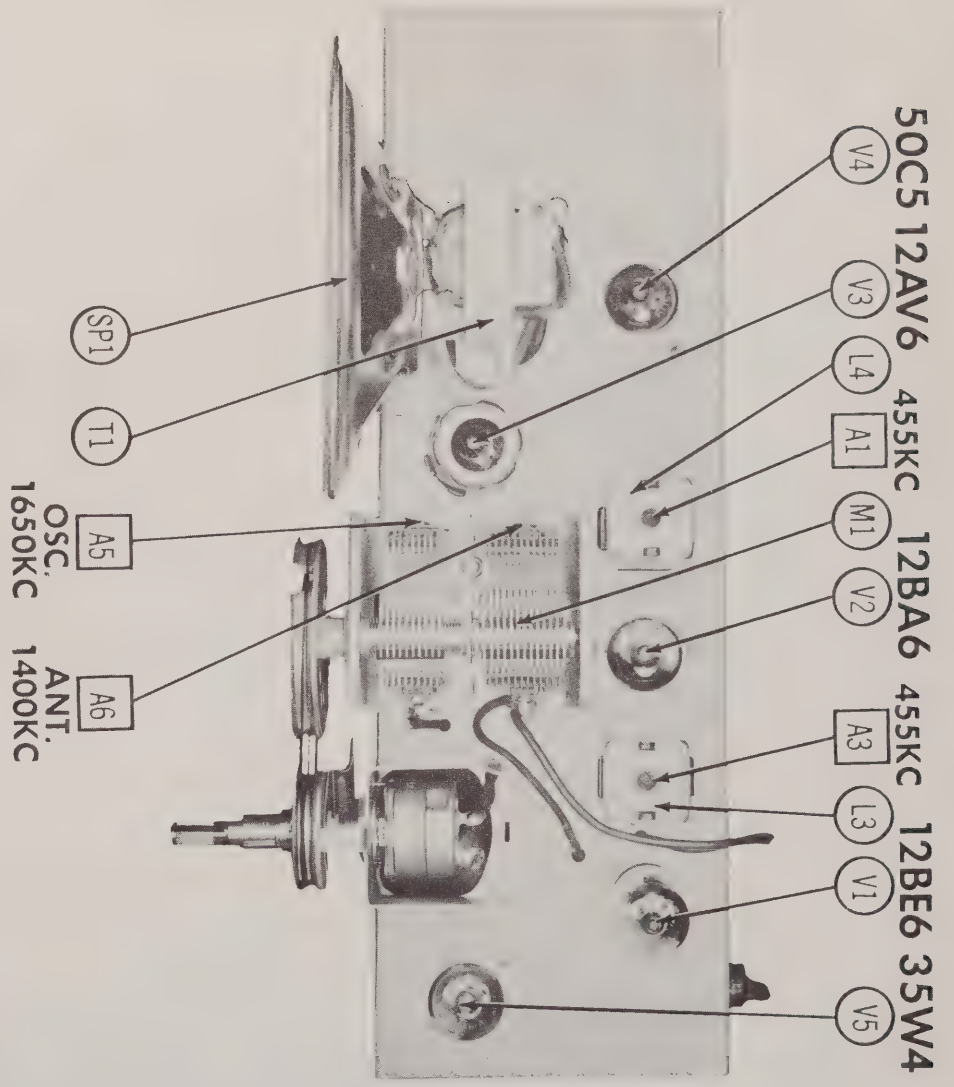
SPEAKER

ITEM No.	RATINGS: SIZE	RATINGS: FIELD	RATINGS: V. C. IMP.	REPLACEMENT DATA: TRUETONE PART No.	JENSEN PART No.	QUAM PART No.	NOTES
SP1	4"	PM	3.1Ω	SPK-73	ST-113 Mod. P4-X	4A1	

TRANSFORMER (AUDIO OUTPUT)

ITEM No.	IMPEDANCE: PRI.	IMPEDANCE: SEC.	REPLACEMENT DATA: TRUETONE PART No.	Stancor PART No.	Merit PART No.	Triad PART No.	Halldorson PART No.	Thordarson PART No.	NOTES
T1	2.4KΩ	3.1Ω	Part of Spkr.	A-3332	A-3025	S-12X	Z1101	26S58	

CHASSIS—TOP VIEW



PARTS LIST AND DESCRIPTIONS (Continued)

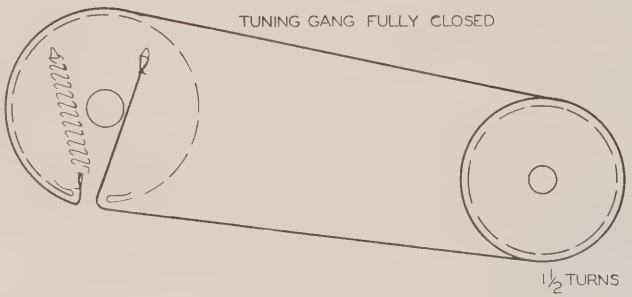
COILS (RF-IF)

ITEM No.	USE	DC RES.		REPLACEMENT DATA				NOTES
		PRI.	SEC.	TRUETONE PART No.	MEISSNER PART No.	MERIT PART No.	MILLER PART No.	
L1	Ant. Coil	.5Ω		LAT85				
L2	Osc. Coil	.7Ω	9.5Ω	LOT85	14-1073		69-OSC *	
L3	Input IF	17Ω	17Ω	LIFT67	16-6758	BC-352	12-C1	
L4	Output IF	17Ω	17Ω	LIFT67	16-6758	BC-353	12-C2	

* Drill mounting hole.

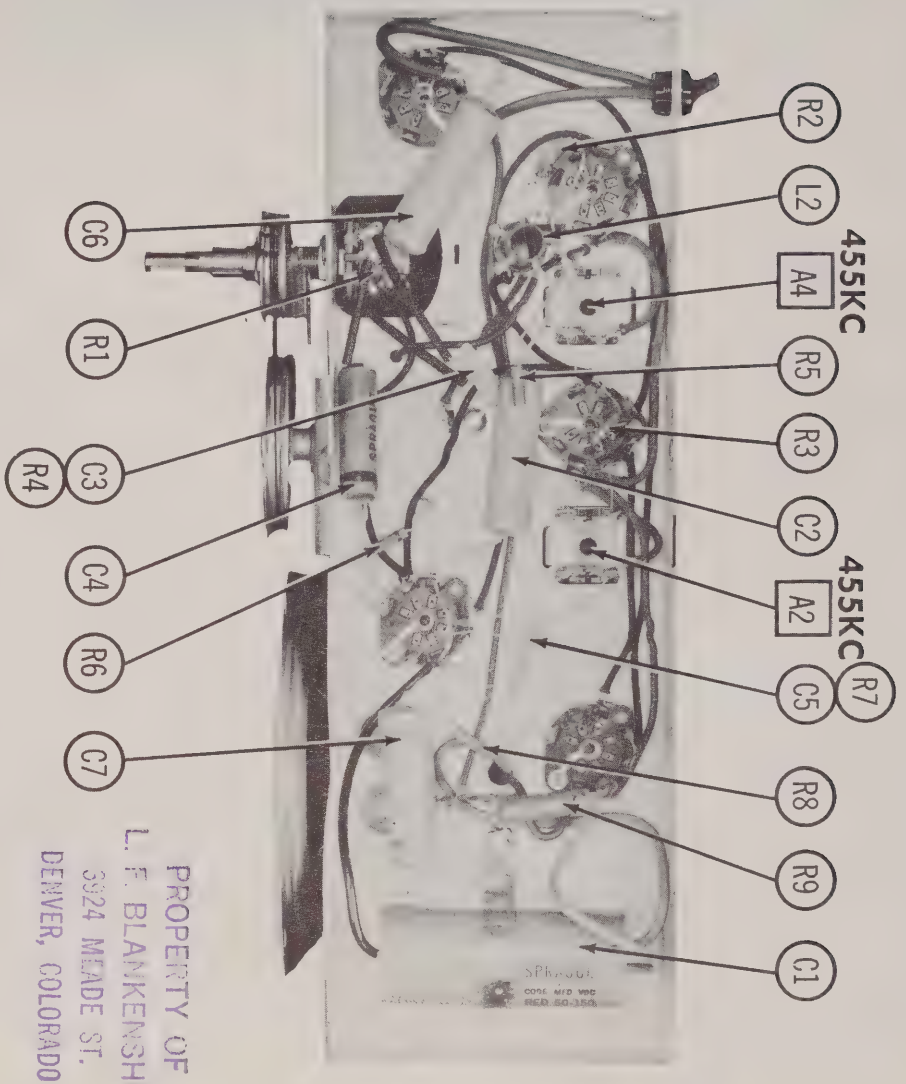
MISCELLANEOUS

ITEM No.	PART NAME	TRUETONE PART No.	NOTES
M1	Tuning Cap.	VCT85	2 Gang (23-420MMF, 23-190MMF)
	Cabinet	A123	Model D2413B
	Cabinet	A120	Model D2410B
	Cabinet	A122	Model D2411B
	Cabinet	A121	Model D2412B
	Cabinet Back	P1709	



DIAL CORD STRINGING

CHASSIS—BOTTOM VIEW



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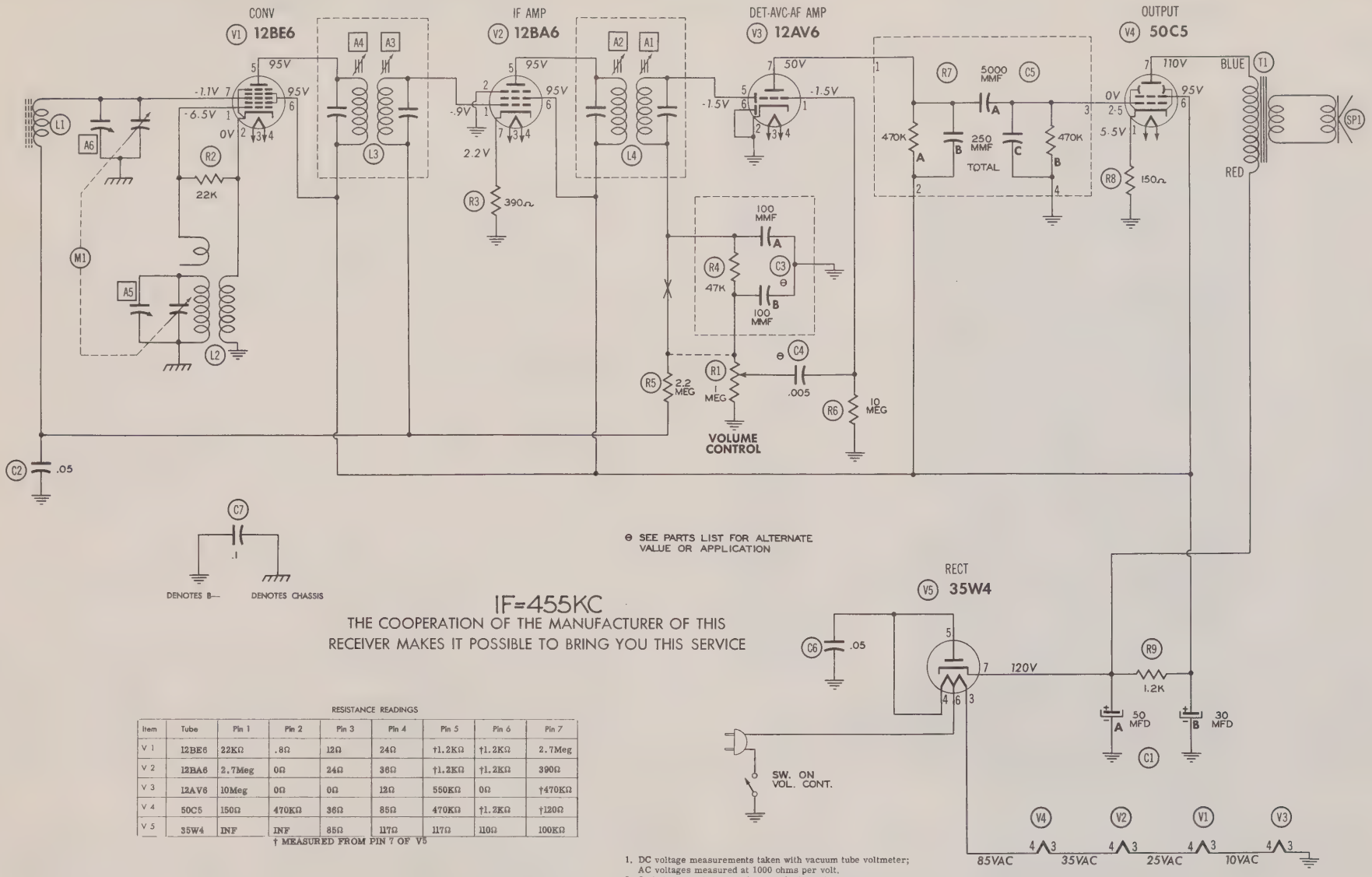
DENVER, COLORADO

TRUETONE MODEL D2410B



θ SEE PARTS LIST FOR ALTERNATE VALUE OR APPLICATION

IF=455KC

THE COOPERATION OF THE MANUFACTURER OF THIS RECEIVER MAKES IT POSSIBLE TO BRING YOU THIS SERVICE

RESISTANCE READINGS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7
V 1	12BE6	22KΩ	.8Ω	12Ω	24Ω	†1.2KΩ	†1.2KΩ	2.7Meg
V 2	12BA6	2.7Meg	0Ω	24Ω	36Ω	†1.2KΩ	†1.2KΩ	390Ω
V 3	12AV6	10Meg	0Ω	0Ω	12Ω	550KΩ	0Ω	†470KΩ
V 4	50C5	150Ω	470KΩ	36Ω	85Ω	470KΩ	†1.2KΩ	†120Ω
V 5	35W4	INF	INF	85Ω	117Ω	117Ω	110Ω	100KΩ

† MEASURED FROM PIN 7 OF V5

1. DC voltage measurements taken with vacuum tube voltmeter; AC voltages measured at 1000 ohms per volt.
2. Socket connections are shown as bottom views.
3. Measured values are from socket pin to common negative.
4. Line voltage maintained at 117 volts for voltage readings.
5. Nominal tolerance on component values makes possible a variation of ± 15% in voltage and resistance readings.
6. Volume control at maximum, no signal applied for voltage measurements.

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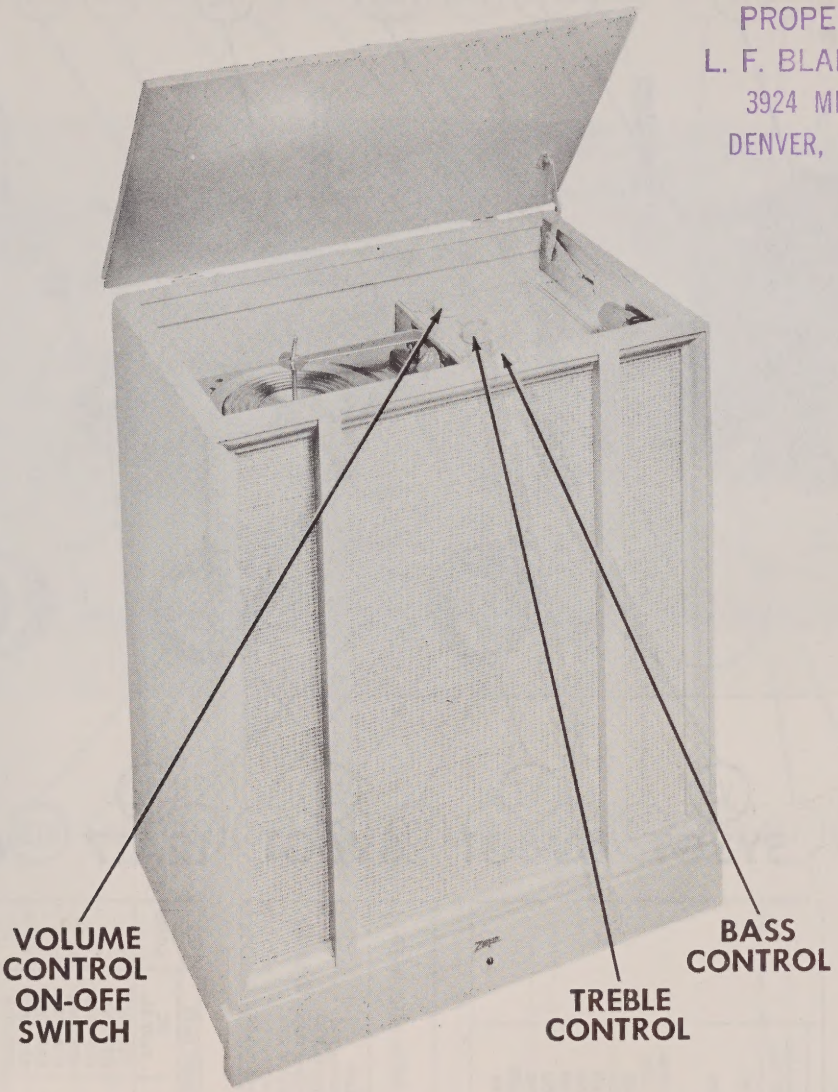
272-15

ZENITH MODELS
HFR-20E, HFR-21R (Ch. 5R20)

PROPERTY OF
L. F. BLANKENSHIP
3924 MEADE ST.
DENVER, COLORADO

ZENITH MODELS
HFR-20E, HFR-21R (Ch. 5R20)



ZENITH MODELS
HFR-20E, HFR-21R (Ch. 5R20)

TRADE NAME	Zenith Models HFR-20E, HFR-21R (Ch. 5R20)
MANUFACTURER	Zenith Radio Corp., 6001 Dickens Ave., Chicago, Ill.
TYPE SET	AC Operated Phono Amplifier With Variable Speed Automatic Record Changer
TUBES (Five)	Types 6J5 Pre-Amp., 12AT7 AF Amp.-Phase Inverter., (2) 6V6GT Output, 5Y3GT Rectifier
POWER SUPPLY	110-120 Volts AC-60 Cycles RATING .59 Amp. @ 117 Volts AC

RECORD CHANGER UNIT - ZENITH MODEL S-14063

HOWARD W. SAMS & CO., INC. • Indianapolis 5, Indiana

"The listing of any available replacement part herein does not constitute in any case a recommendation, warranty or guaranty by Howard W. Sams & Co., Inc., as to the quality and suitability of such replacement part. The numbers of these parts have been compiled from information furnished to Howard W. Sams & Co., Inc., by the manufacturers of the particular type of replacement part listed." "Reproduction or use, without express permission, of editorial or pictorial content, in any manner, is prohibited. No patent liability is assumed with respect to the use of the information contained herein. Copyright 1955 by Howard W. Sams & Co., Inc., Indianapolis 5, Indiana, U. S. of America. Copyright under International Copyright Union. All rights reserved under Inter-American Copyright Union (1910) by Howard W. Sams & Co., Inc." Printed in U. S. of America

PARTS LIST AND DESCRIPTIONS

TUBES (SYLVANIA, GENERAL ELECTRIC, WESTINGHOUSE)

ITEM No.	USE	REPLACEMENT DATA: ZENITH PART No.	REPLACEMENT DATA: STANDARD REPLACEMENT	RETMA BASE TYPE	NOTES
V1	Pre-Amplifier	6J5	6J5	6Q	
V2	AF Amplifier-Phase Inverter	12AT7	12AT7	9A	
V3	Output	6V6GT	6V6GT	7S	
V4	Output	6V6GT	6V6GT	7S	
V5	Rectifier	5Y3GT	5Y3GT	5T	

CAPACITORS

Capacity values given in the rating column are in mfd. for Electrolytic and Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING: CAP.	RATING: VOLT	REPLACEMENT DATA: ZENITH PART No.	CENTRALAB PART No.	ERIE PART No.	MALLORY PART No.	PYRAMID PART No.	SANGAMO PART No.	
C1A	▲40	450	22-1612			FP238	TM-D40-450	D-235	
B	▲40	450							
C2A	▲20	350	22-2627			FP345.5	TM-3080	Q-305	
B	■20	350							
C	▲40	25							
C3	20	25	22-2633			TC26	TD-25-25	FM-0225	
C4	20	25	22-2633			TC26	TD-25-25	FM-0225	
C5	.05	600	22-171	DF-503		PT615	IMP6-S5	330615	
C6	.05	200	22-829			PT415	IMP2-S5	330215	
C7	330		22-2309					K-1333	
C8	.5	120	22-2573			PT405	IMP2-P5	330205	
C9	100		22-9	DD-101	801-0001	UC-531		K-1310	
C10	.1	600	22-417	DF-104		PT601	IMP6-P1	330601	
C11	.1	600	22-417	DF-104		PT601	IMP6-P1	330601	
C12	.0005	1600	22-2494			PT1635	CT60-T5	3301635	
C13	10000		22-3	DD-103	811-01	DC-511	IMP6-S1	330611	
C14	1.0	120	22-1623						

CONTROLS

ITEM No.	RATING: RESISTANCE	RATING: WATTS	REPLACEMENT DATA: ZENITH PART No.	IRC PART No.	CLAROSTAT PART No.	CENTRALAB PART No.	MALLORY PART No.	INSTALLATION NOTES
R1A	500KΩ	½	63-3252	Q11-133	A47-500K-S	AB-617	U-50	Volume
B	Shaft		Not Req.	Not Req.	KSS-3	AK-4	Not Req.	Attach to R1A
C	Switch		Not Req.	76-1	SWE-12	KB-1	US-26	Attach to R1A
R2A	1.5Meg	½	63-3250			ABT-82		Treble - tapped @ 1.4Meg
B	Shaft		Not Req.			AK-4		Attach to R2A
R3A	50KΩ	½	63-3251	Q13-123	A47-50K-Z	AB-32	U-33	Bass
B	Shaft		Not Req.	Not Req.	KSS-3	AK-4	Not Req.	Attach to R3A

RESISTORS

ITEM No.	RATING: OHMS	RATING: WATT	REPLACEMENT DATA: ZENITH PART No.	IRC PART No.	NOTES
R4	6.8Meg	½	63-1946	BTS-6.8Meg	
R5	680Ω	½	63-1778	BTS-680	
R6	33KΩ	1	63-957	BTA-33K	
R7	82KΩ	½	63-1866	BTS-82K	
R8	27KΩ	½	63-1845	BTS-27K	
R9	220KΩ	½	63-1884	BTS-220K	
R10	1500Ω	½	63-1793	BTS-1500	
R11	1200Ω	½	63-1789	BTS-1200	
R12	680Ω	½	63-1778	BTS-680	
R13	3300Ω	½	63-1807	BTS-3300	
R14	220KΩ	½	63-1884	BTS-220K	

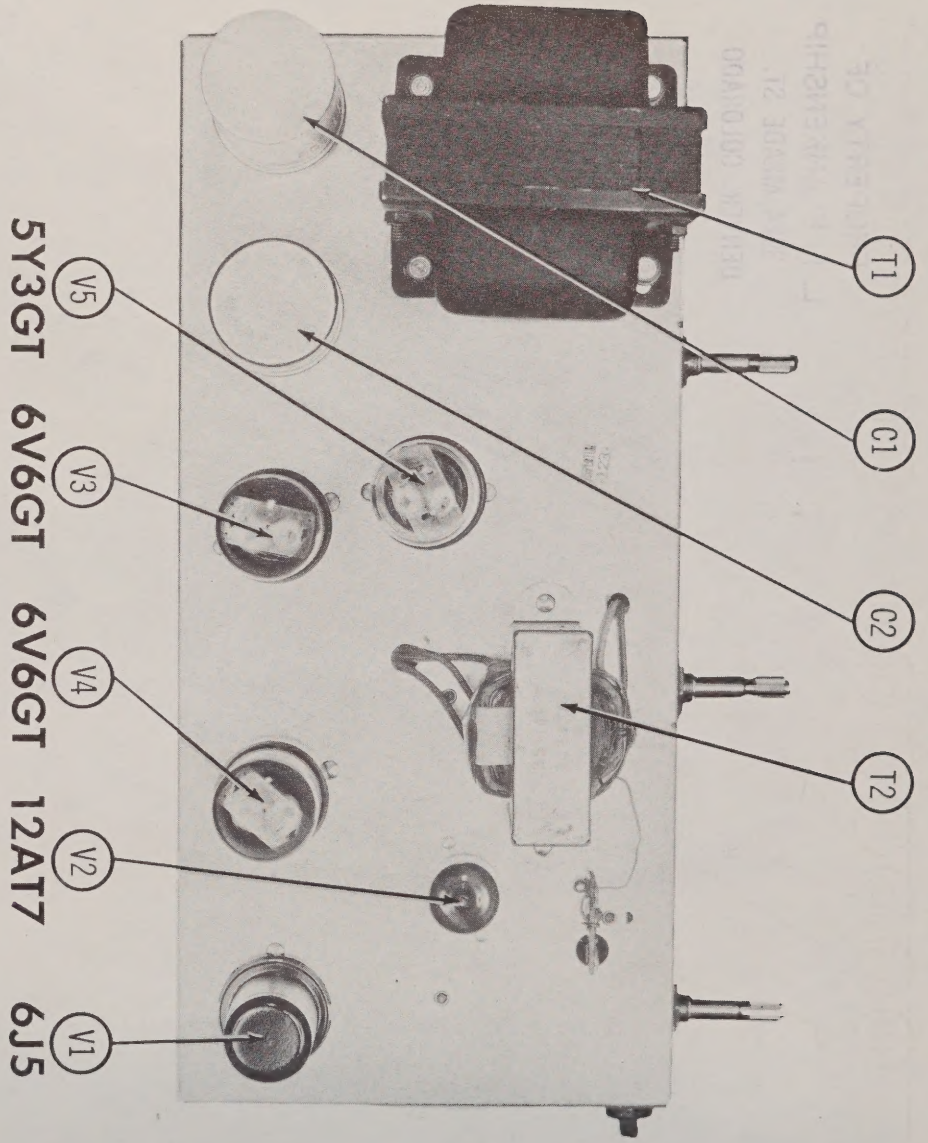
ITEM No.	RATING: OHMS	RATING: WATT	REPLACEMENT DATA: ZENITH PART No.	IRC PART No.	NOTES
R15	220KΩ	½	63-1883	BTS-220K	
R16	3300Ω	½	63-1806	BTS-3300	
R17	220KΩ	½	63-1883	BTS-220K	
R18	330KΩ	½	63-1890	BTS-330K	
R19	270KΩ	½	63-1887	BTS-270K	
R20	220Ω	2	63-3231	BTB-220K	
R21	10KΩ	½	63-1827	BTS-10K	
R22	470KΩ	½	63-1898	BTS-470K	
R23	120Ω	2	63-2281		
R24	5600Ω	2	63-1193	BTB-5600	
R25	6800Ω	½	63-1820	BTS-6800	

TRANSFORMER (POWER)

ITEM No.	RATING: PRI.	RATING: SEC. 1	RATING: SEC. 2	RATING: SEC. 3	REPLACEMENT DATA: ZENITH PART No.	Stancor PART No.	Merit PART No.	Triad PART No.	Halldorson PART No.	Thordarson PART No.
T1	117VAC @.59A	670VCT .084A	5VAC @2A	6.3VCT @1.65A	95-1410	PC-8409 ①	P-3152 ①	R-11A ①	P9310 ①	24R02U①

① Drill new mounting hole.

CHASSIS—TOP VIEW



PARTS LIST AND DESCRIPTIONS (Continued)

TRANSFORMER (AUDIO OUTPUT)

ITEM No.	IMPEDANCE		REPLACEMENT DATA						NOTES
	PRI.	SEC.	ZENITH PART No.	Stancor PART No.	Merit PART No.	Triad PART No.	Halldorson PART No.	Thordarson PART No.	
T2	9.8KΩ CT	3.6Ω tap ⓐ 1.6Ω	95-1411	A-3870	A-2901 ①	S-55X ①	Z1011	24S61 ①	① Drill one new mounting hole.

SPEAKER

ITEM No.	RATINGS			REPLACEMENT DATA			NOTES
	SIZE	FIELD	V. C. IMP.	ZENITH PART No.	JENSEN PART No.	QUAM PART No.	
SP1	12"	PM	3.6Ω	49-740		10A10Z3.2	
SP2	3½"	PM	11.8Ω	49-777		3A15T	

FUSES

ITEM No.	TYPE	RATING	REPLACEMENT DATA					
			ZENITH PART No.		LITTELFUSE PART No.		BUSS PART No.	
			FUSE	HOLDER	FUSE	HOLDER	FUSE	HOLDER
M1	3AG (P/T)	1¼A 250V	136-29		31801.5 (3AG P/T-1.5A)		GJV 1¼A	

PHONO CARTRIDGE

ITEM No.	REPLACEMENT DATA					REMARKS
	ZENITH PART No.	ASTATIC PART No.		ELECTRO-VOICE PART No.		
		CARTRIDGE	NEEDLE	CARTRIDGE	NEEDLE	
M2						

MISCELLANEOUS

ITEM No.	PART NAME	ZENITH PART No.	NOTES
M3	Jewel Light	100-67	#47, Bayonet
	Cabinet	14-1766	Model HFR20E
	Cabinet	14-1767	Model HFR21R
	Knob	46-1356	on-off-volume - Model HFR20E
	Knob	46-1019	on-off-volume - Model HFR21R
	Knob	46-1357	Tone - Model HFR20E (2 used)
	Knob	46-1020	Tone - Model HFR21R (2 used)

PROPERTY OF
L. F. BLANKENSHIP
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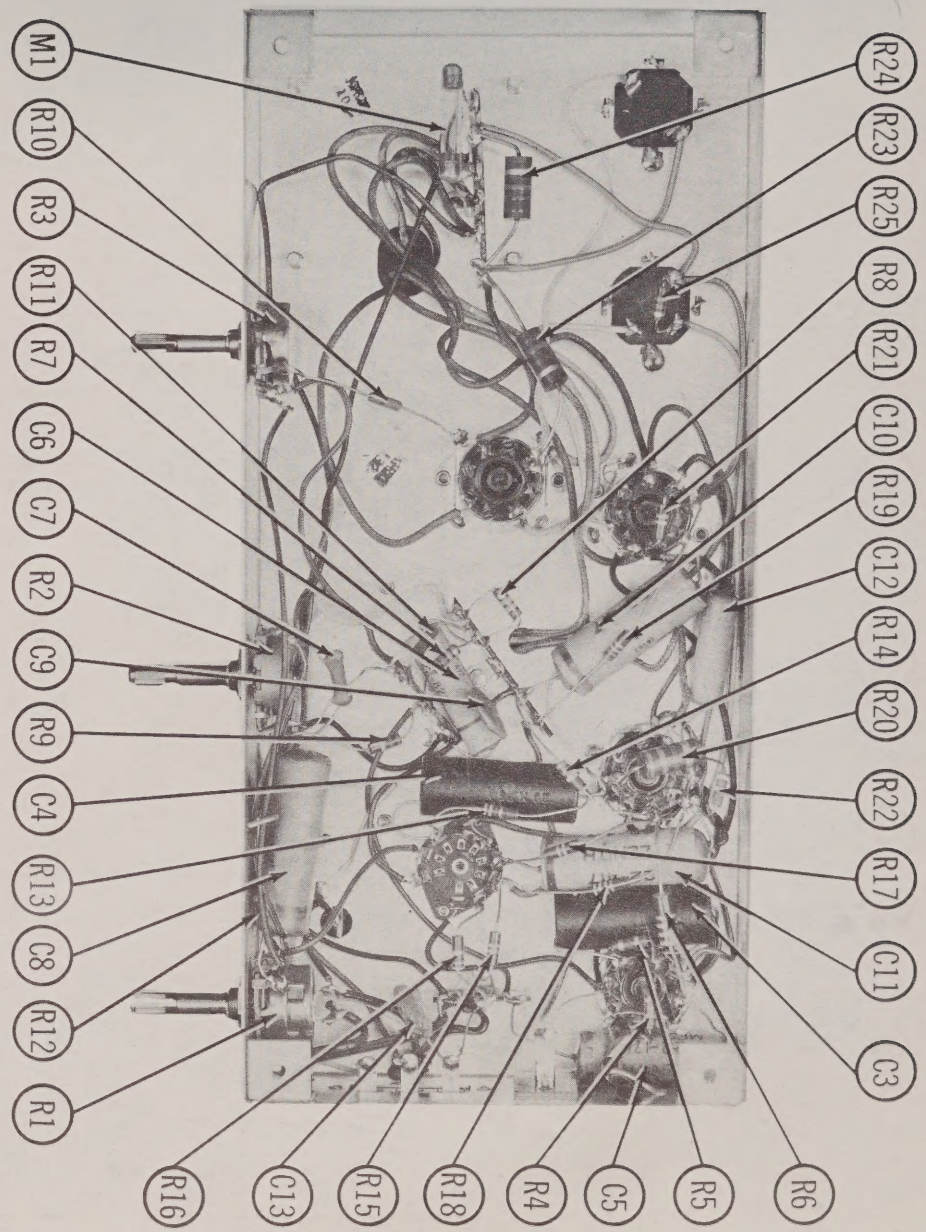
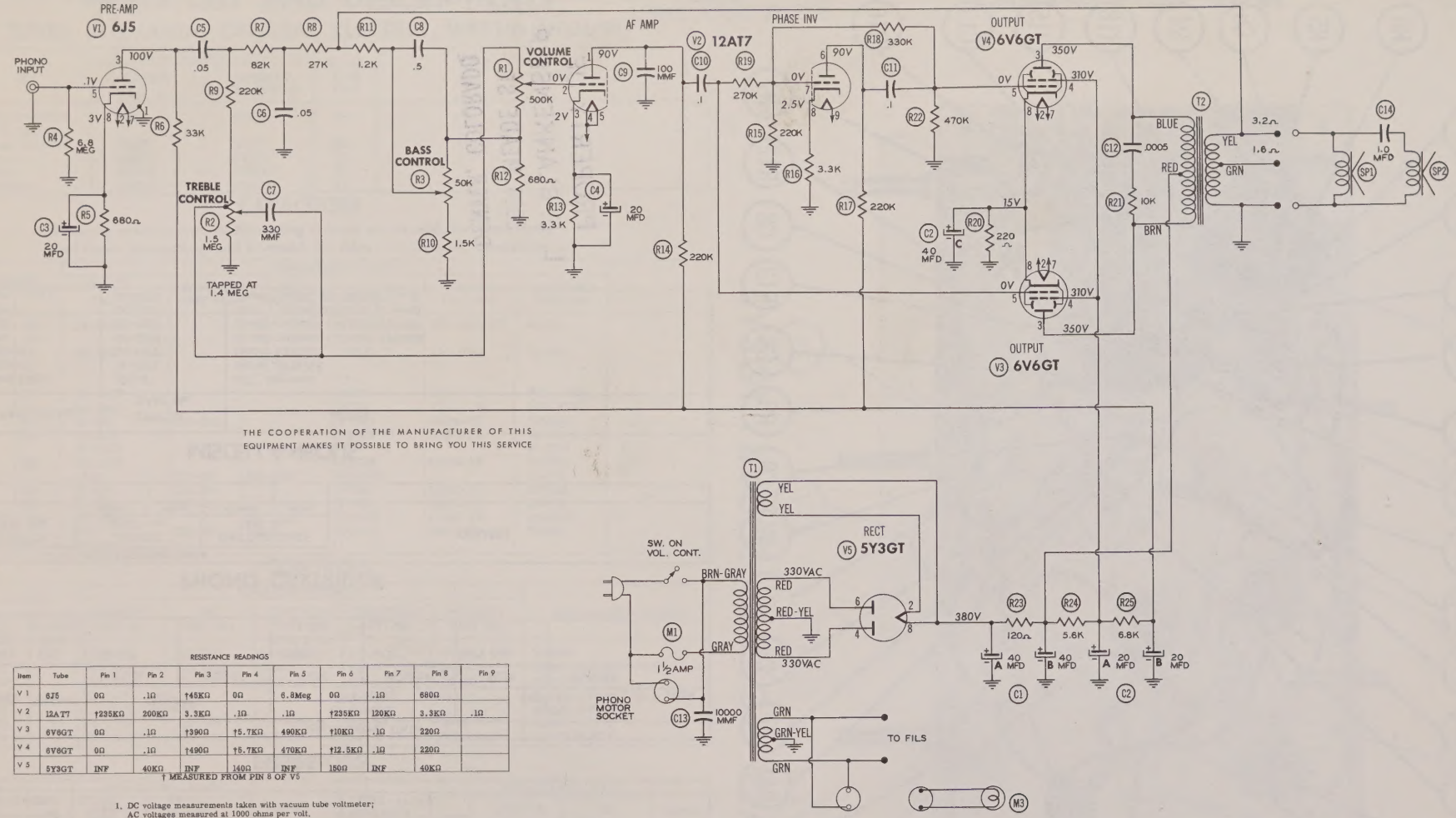
DENVER, COLORADO

CHASSIS—BOTTOM VIEW



ZENITH
MODEL HFR-20E (Ch. 5R20)



RESISTANCE READINGS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8	Pin 9
V 1	6J5	0Ω	.1Ω	†45KΩ	0Ω	6.8Meg	0Ω	.1Ω	680Ω	
V 2	12AT7	†235KΩ	200KΩ	3.3KΩ	.1Ω	.1Ω	†235KΩ	120KΩ	3.3KΩ	.1Ω
V 3	6V6GT	0Ω	.1Ω	†390Ω	†5.7KΩ	490KΩ	†10KΩ	.1Ω	220Ω	
V 4	6V6GT	0Ω	.1Ω	†490Ω	†5.7KΩ	470KΩ	†12.5KΩ	.1Ω	220Ω	
V 5	5Y3GT	INF	40KΩ	INF	140Ω	INF	150Ω	INF	40KΩ	

† MEASURED FROM PIN 8 OF V5

1. DC voltage measurements taken with vacuum tube voltmeter; AC voltages measured at 1000 ohms per volt.
2. Socket connections are shown as bottom views.
3. Measured values are from socket pin to common negative.
4. Line voltage maintained at 117 volts for voltage readings.
5. Nominal tolerance on component values makes possible a variation of ± 15% in voltage and resistance readings.
6. All controls at minimum, proper output load connected.

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